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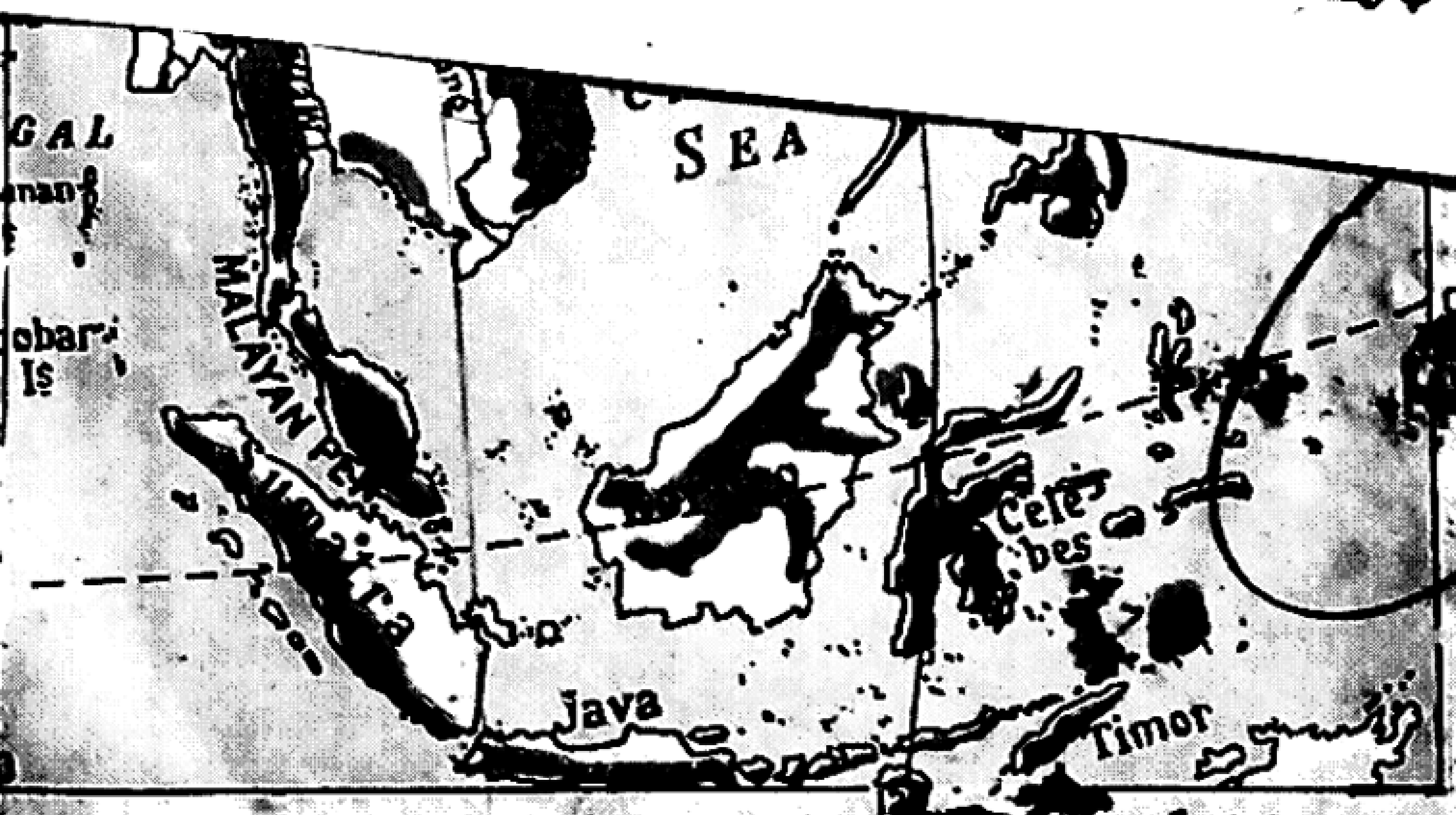

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CONTENTS

PART IV

ASIA

CHAP. PAGE

I. The Seas and Lowlands 1
II. The Central Mountains and their Rivers . . 6
III. Lowlands and Tablelands 17
IV. The Climate of Asia 20
V. Plants, Animals, and Men 31
VI. Siberia 45
VII. The Near East 53
VIII. The Desert Belt 64
IX. The Wetter Lands of the Mountain Belt . . 74
X. India and Ceylon. I. Climate and Products . 83
XI. India and Ceylon. II. Regional Divisions . 93
XII. Eastern Asia 104
Index 120

PART V

AFRICA AND AUSTRALASIA

AFRICA

I. The Relief of Africa 121
II. The Climate of Africa 128
III. Plants, Animals, and Men 135
IV. The Atlas Lands and the Sahara 146
V. Egypt and the Nile Lands 154
VI. The Lake Plateaus of East Africa . . . 163
VII. Savanas and Forests of West Africa . . . 174
VIII. South Africa 182

AUSTRALASIA

IX. The Relief of Australia 193
X. Climate, Plants, and Animals 201
XI. The Commonwealth of Australia 211
XII. New Zealand and the Pacific Islands . . . 223
Index 232

PART VI

AMERICA

CHAP. PAGE
I. THE RELIEF OF AMERICA 233
II. THE ATLANTIC HIGHLANDS AND THE CENTRAL PLAINS OF NORTH AMERICA 241
III. THE WESTERN CORDILLERA 253
IV. THE CLIMATE OF NORTH AMERICA 261
V. PLANTS, ANIMALS, AND MEN 271
VI. NEWFOUNDLAND AND CANADA 283
VII. THE UNITED STATES 308
VIII. MEXICO, CENTRAL AMERICA, AND THE WEST INDIES 327
IX. THE RELIEF OF SOUTH AMERICA 337
X. CLIMATE, PLANTS, AND ANIMALS 345
XI. STATES OF SOUTH AMERICA 357
INDEX 375

COLOURED MAPS

ASIA . . . . *front end-paper*
AFRICA AND AUSTRALIA . . . . . . *before page* 121
NORTH AND SOUTH AMERICA . . . . . *back end-paper*

LIST OF ILLUSTRATIONS

PART IV

ASIA

FIGS. PAGE
1. Distance from the Sea in Asia 3
2. Relief Map of Asia 4
3. Key to Relief Map of Asia 7
4. Comparative Height of the Himalayas, Alps, and Scottish Highlands 10
5. Chief Railways crossing the Lowlands of Eurasia . . 16
6–7. Temperature and Rainfall of Asia 21, 22
8–9. Rainfall of Asia 26, 27
10. The Natural Vegetation of Asia 70
11. View of the Pamirs 37
12. Irkutsk Cathedral 51
13. A Siberian Village 51
14. The Near East 54
15. Some Food Products of South-west Asia 70
16. A Himalayan Gorge 78
17–18. Views of Lhasa 81
19. Relief Map of India, Burma and Ceylon 84
20–3. Climate of India 86
24–5. Distribution of Rice and Wheat in India 86
26. Routes and Towns of India 94
27. Benares 97
28. The Far East 105
29. Distribution of Coal and Iron in China 109
30. Density of Population in the Monsoon Lands . . . 112
31. A Japanese Landscape 114
32. Commercial Routes to India, Australia, and the Far East 118

PART V

AFRICA AND AUSTRALASIA

FIGS. PAGE
33. Relief of Africa 122
34. Distance from the Sea in Africa 130
35–7. Temperature of Africa 130
38–9. Rainfall of Africa 132
40. The Natural Vegetation of Africa 136
41. A Tropical Forest in the Congo State 139
42. A Savana Landscape 141
43. Plant and Animal Products of Africa 143
44. A Ruined Roman City in the Desert 149
45. The Nile below Khartum 158
46. The Citadel of Cairo 161
47. The Sphinx and the Pyramids 161
48. Towns and Routes of Central and South Africa . . 164
49. Mombasa 171
50. The Victoria Falls 171
51. Majuba 183
52. A River in Natal 183
53. Cape Town 188
54. South Africa 189
55. Distance from the Sea in Australia 197
56. Area of Inland Drainage in Australia 197
57–60. Temperature and Rainfall of Australia . . . 200
61–2. Summer and Winter Rainfall of Australia . . . 202
63. The Natural Vegetation of Australia 205
64. Eucalyptus, Savana, and Pasture Land 207
65. An Artesian Well 207
66. Political Divisions and Towns of Australia . . . 212
67. Railways of Australia 212
68. Sydney Harbour 217
69. Relief of New Zealand 224
70. Rainfall of New Zealand 224

PART VI

AMERICA

FIGS. PAGE
71–2. Distance from the Sea in North and South America . 234
73. Relief of North America 238
74–5. Niagara Falls and Gorge 245
76. Key to Relief Map of North America 252
77. The Yosemite Valley and Fall 259
78–81. Temperature and Rainfall of North America . . 262
82. The Natural Vegetation of North America . . . 272
83. A Tropical Forest in the West Indies 275
84. The Canadian Prairie 279
85. Physical Features of Eastern Canada 288
86. Routes and Towns of Eastern Canada 288
87. Physical Features of Western Canada 296
88. Routes and Towns of Western Canada 296
89. Reaping the Prairie Wheatfields 299
90. Peaks and Valleys in the Canadian Rockies . . . 303
91. Mount Sir Donald (Selkirk Range) 303
92. Routes across the Appalachians from the Great Lakes to the Atlantic 312
93. New York 315
94. Main Railway Routes of Canada and the United States . 316
95. Distribution of Coal in the United States 318
96. Chief Crops of the United States 318
97. Field of Pineapples in Tropical America 331
98. Havana Cathedral 335
99. Relief of South America 336
100. Key to Relief Map of South America 338
101–4. Temperature and Rainfall of South America . . . 344
105. The Natural Vegetation of South America . . . 348
106. Cactus on the dry slopes of the Andes 351
107. Some Economic Products of South America . . . 356
108. Principal Railways of South America 356
109–10. Rio de Janeiro 372

AUTHOR'S NOTE.

At the end of a long task it is difficult to remember and still more to record all the obligations which have been incurred. A list of all the books and papers which have been consulted for particular points would run to many pages. The various volumes of the Oxford Geographies have been of great use, particularly Dr. Marcel Hardy's *Plant Geography* and Dr. Marion Newbigin's *Animal Geography.* For climate, Dr. Julius Hann's *Handbuch der Klimatologie* is indispensable, and all the statistics have been taken from it except those for Africa, which are from *The Climate of Africa*, by the late Mr. Alexander Knox. The *International Geography*, edited by Dr. H. R. Mill, and the *Descriptive Geographies*, edited by F. D. Herbertson, have also been constantly consulted; and the *Statesman's Year-book*, edited by Dr. J. S. Keltie, is a mine of information. The kindness of Madame de Oliviera-Lima and Professor Charles Sarolea enabled me to procure copyright photographs from the representatives of the Brazilian and Belgian Governments, and the Agent for South Australia, the Royal Colonial Institute, Sir Frederick Treves, Bart., C. Reginald Enock, Esq., Mrs. Collier and others were good enough to lend me photographs. I have also to thank the Editor of the Oxford Geographies for ungrudging assistance and valuable criticism at every stage of the book's progress; Miss C. Hearne and Miss E. Smith, for constant help and kindness; and the staff of the Clarendon Press for their unfailing consideration.

Two Shires' Yew, Sprigg's Alley,
Chinnor, Oxon,
1913.

PART IV

ASIA

CHAPTER I

THE SEAS AND LOWLANDS

Use the globe, the coloured maps in this book, and the Oxford Wall Maps of Asia

640. The Continent of Asia. It is more convenient than correct to speak of Europe and Asia as separate continents. In reality they form a single great continent which is called Eurasia. The Ural Mountains, the Ural River, the Caspian Sea, and the Caucasus Mountains form part of the frontier between the two continents.

641. Study the position of Asia on the globe. Europe lies to the west of Asia, and forms its only land boundary. The narrow isthmus of Suez joins Eurasia to Africa, the remaining continent of the Old World. The peninsula of Asia Minor projects westwards into the Mediterranean. Notice how close the shores of Asia are to Europe at the Bosporus, which is held by Constantinople. Find also the narrow strait of Bab-el-Mandeb, where the shores of Asia are within 14 miles of the African coast. The southern, eastern, and northern coasts of Asia are washed by the Indian Ocean, the Pacific Ocean, and the Arctic Ocean. In the extreme north-east the coast of the Old World is within 40 miles of the New World, the two being separated by the narrow Bering Strait. This would be more important if the neighbouring shores were in lower latitudes.

642. The globe shows that Asia is the largest of the continents (17,000,000 square miles), or more than four times the size of Europe (3,800,000 square miles). Notice that Asia is not only much larger but also very differently placed in latitude. Europe lies entirely north of the northern tropic and almost entirely outside the Arctic Circle. Asia, including its islands, stretches from the equator to within 10° of the North Pole. This gives it a much greater variety of climate and plants than Europe.

642a. The most northerly point on the mainland is in lat. 77° 30′ N. lat., and the most southerly in lat. 1° 25′ N. lat. The islands extend considerably farther north and south.

643. Compare the globe, the wall map, and the coloured map at the beginning of the book. Asia, like Europe, is cut by the sea into peninsulas and islands. Asia Minor has already been mentioned. On the south three great peninsulas, Arabia, India, and Indo-China, project south into the Indian Ocean. The Pacific coast is fringed with islands which enclose four sea basins. As a whole Asia is far more compact than Europe. No seas pierce it so deeply as do the Northland and Midland Seas of Europe, and its peninsulas and islands are small in proportion to the size of its unbroken land. This is well seen in Fig. 1. The circle in this diagram has a radius of 2,000 miles, and contains nearly all the land and hardly any of the seas of Asia. The same fact is illustrated by comparing the coastline of the two continents. Europe has a coast 23,000 miles long, but Asia, though more than four times as large, has less than twice the coastline (44,000 miles). We have seen how greatly the seas, coasts, and harbours of Europe affect the climate, products, and occupations of the people. Most of Asia is too far from the sea to be affected by it.

643a. Find the Arabian Sea between Arabia and India, and the Bay of Bengal between India and Indo-China. Find also the long, narrow, almost land-locked Red Sea between Africa and Arabia, and the Persian Gulf between Arabia and Persia.

643b. On the east coast the four seas are enclosed between loops of islands and the mainland. They are (i) the Sea of Okhotsk, enclosed by the Kurile Islands and the Kamchatka peninsula; (ii) the Sea of Japan, between the Japanese Islands and the peninsula of Korea; (iii) the Yellow and East China Seas, enclosed by the Lu-chu Islands and Formosa; and (iv) the South China Sea, enclosed by the East Indian Islands (Sumatra, Java, Borneo, and Celebes) and the Sunda, Molucca, and Philippine groups.

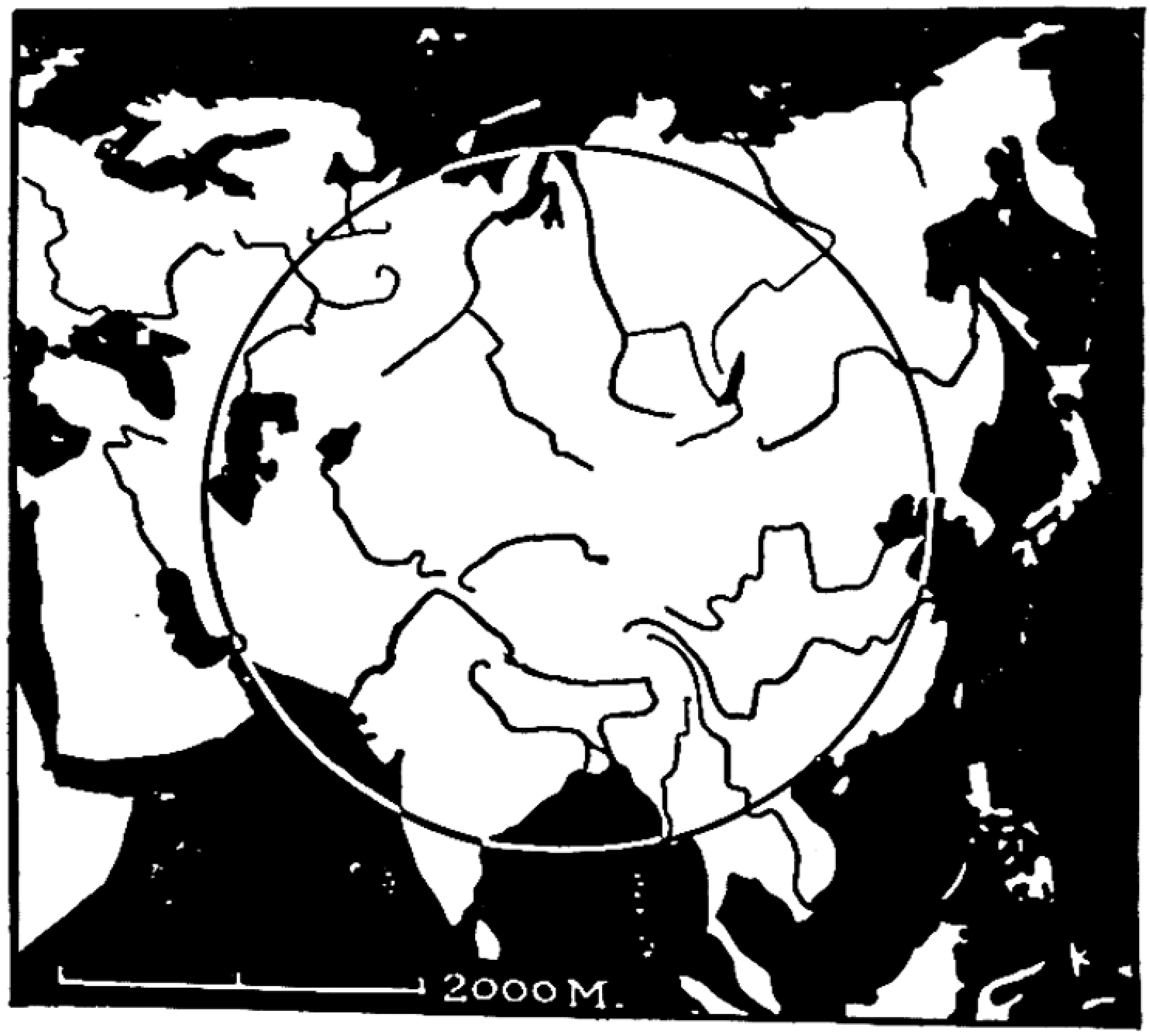

Fig. 1. Distance from the Sea in Asia.

644. Relief of Asia. Compare the coloured map of Asia with the diagram in Fig. 2. A glance shows how high Asia is above the sea. In the coloured map contour lines are drawn for 1,500 feet and 6,000 feet. About half the continent is coloured brown, and is 1,500 feet or more high. The dark brown land is 6,000 feet or more high. About one-twelfth of the whole continent is over

12,000 feet high. The floors of the highest inhabited valleys are as high as the highest summits of the Alps.

645. In Fig. 2 the contour lines show the depth of

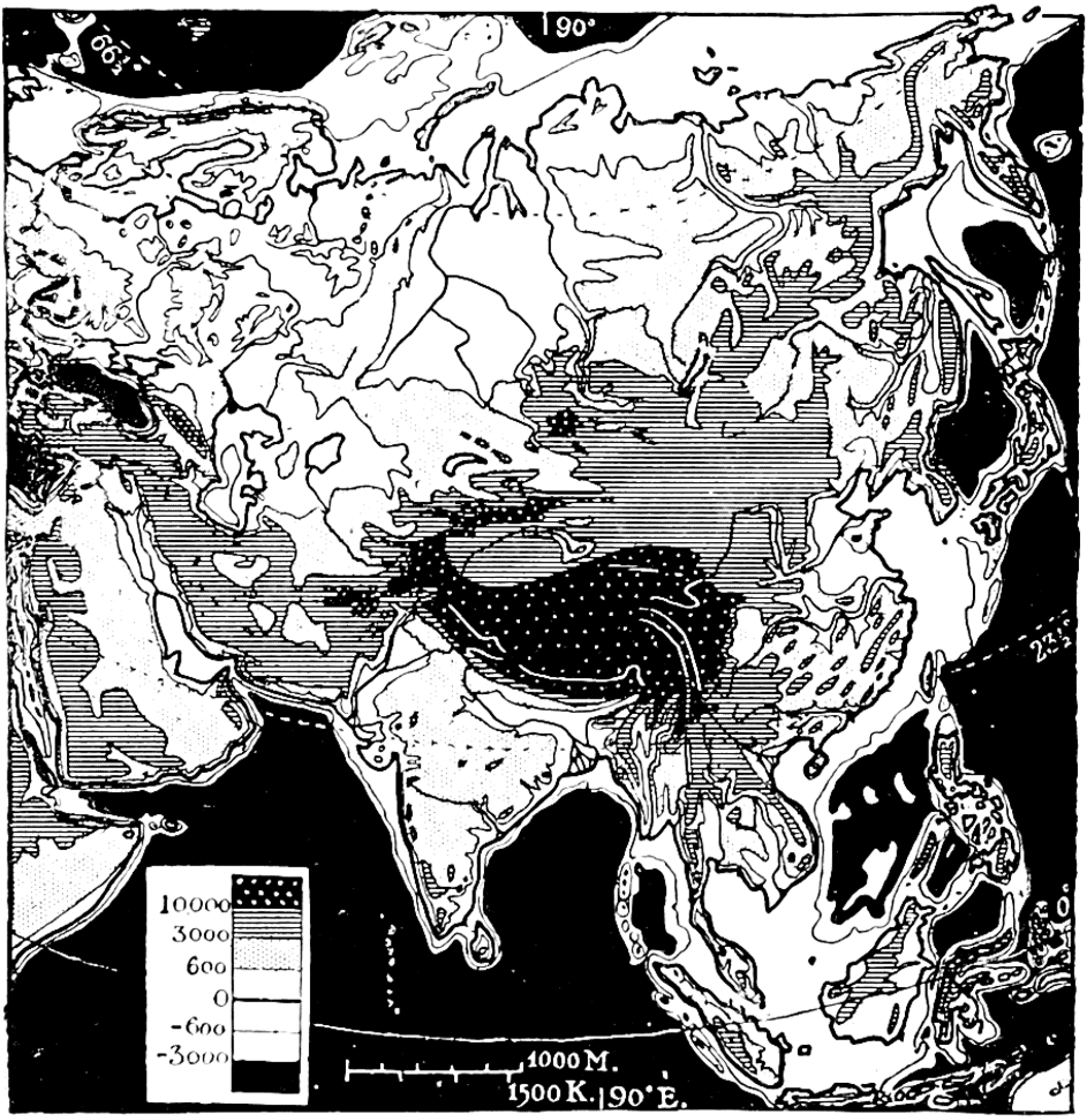

Fig. 2. Relief of Asia.

the seas as well as the height of the land. About one-quarter of Asia is less than 600 feet above sea-level. The largest lowlands are in the north and west, and are a continuation of the lowlands of Eastern Europe. A second but more broken belt of lowlands can be traced along the southern and eastern margins of the high land which forms the core of the continent. These lie round the lower courses of the rivers, and form some of the most fertile and densely-peopled lands in the world. South of these are the high tablelands of Arabia and peninsular India or the Deccan. The continental shelf is broadest off the Arctic coast and the island-fringed Pacific coast. Deep sea basins, coloured black, show that parts of it have sunk along the Pacific coast, where the Japanese islands and many others are volcanic (§ 654).

646. Asia thus consists of four belts of relief:

(i) The North-western Lowlands.

(ii) The Central Highlands and Mountains.

(iii) The Southern Lowlands on the southern and eastern margins of the Central Mountains.

(iv) The Southern Tablelands.

647. The average elevation of Asia is very high. If levelled the whole continent would still be 3,000 feet high, whilst Europe (466a) would be under 1,000 feet.

Exercises

1. On an outline map of Asia mark in red the Arctic Circle, the Tropic of Cancer, and the Equator. Estimate as nearly as you can the proportion of the continent (*a*) within the Arctic Circle, (*b*) between the Arctic Circle and the Tropic of Cancer, and (*c*) between the Tropic of Cancer and the Equator.

2. On the same map shade the land over 1,500 feet high, and blacken the land over 6,000 feet high.

3. Point out the chief differences in the position of the seas, lands, mountains, and lowlands of Europe and Asia.

CHAPTER II

THE CENTRAL MOUNTAINS AND THEIR RIVERS

648. Breadth of the Mountain Belt. The highlands and mountains of Asia are known by many names. The more important are given in Fig. 3, which shows how the chief lines of height are arranged. The coloured map shows that the mountain barrier is narrowest in two places, (i) in the Armenian Highlands, which separate the Black Sea to the north from the Mesopotamian lowland to the south; and (ii) in the Pamir Plateau, which separates the lowlands of Turan on the north from the plains of Northern India on the south. East of the Pamirs the mountain barrier reaches its greatest breadth and height. In the extreme east it extends from the shores of the Arctic Ocean to the extreme south of the Indo-China peninsula.

649. The arrangement of the lines and masses ot darker brown show roughly the direction of the lines of height and how these converge or diverge. Their direction is on the whole from east to west, except along the eastern margin where it is from north to south. Notice the resemblance between the curves (i) of these eastern heights, (ii) of the coast of the mainland, and (iii) of the island festoons beyond. Such comparisons help us to remember the general arrangement of mountains and rivers and the direction of the main routes.

650. Divisions of the Central Mountains. The Central Mountains of Asia continue the mountains of Europe, and the two together are often called the Mid-World Mountains. They consist of many chains or groups which enclose high plateaus, e.g. Asia Minor, Iran, and Tibet, or basins like the Tarim. These well-defined mountain chains in turn are made up of many different ranges, high plateaus, and deep river valleys. The plateaus and basins are themselves crossed by heights.

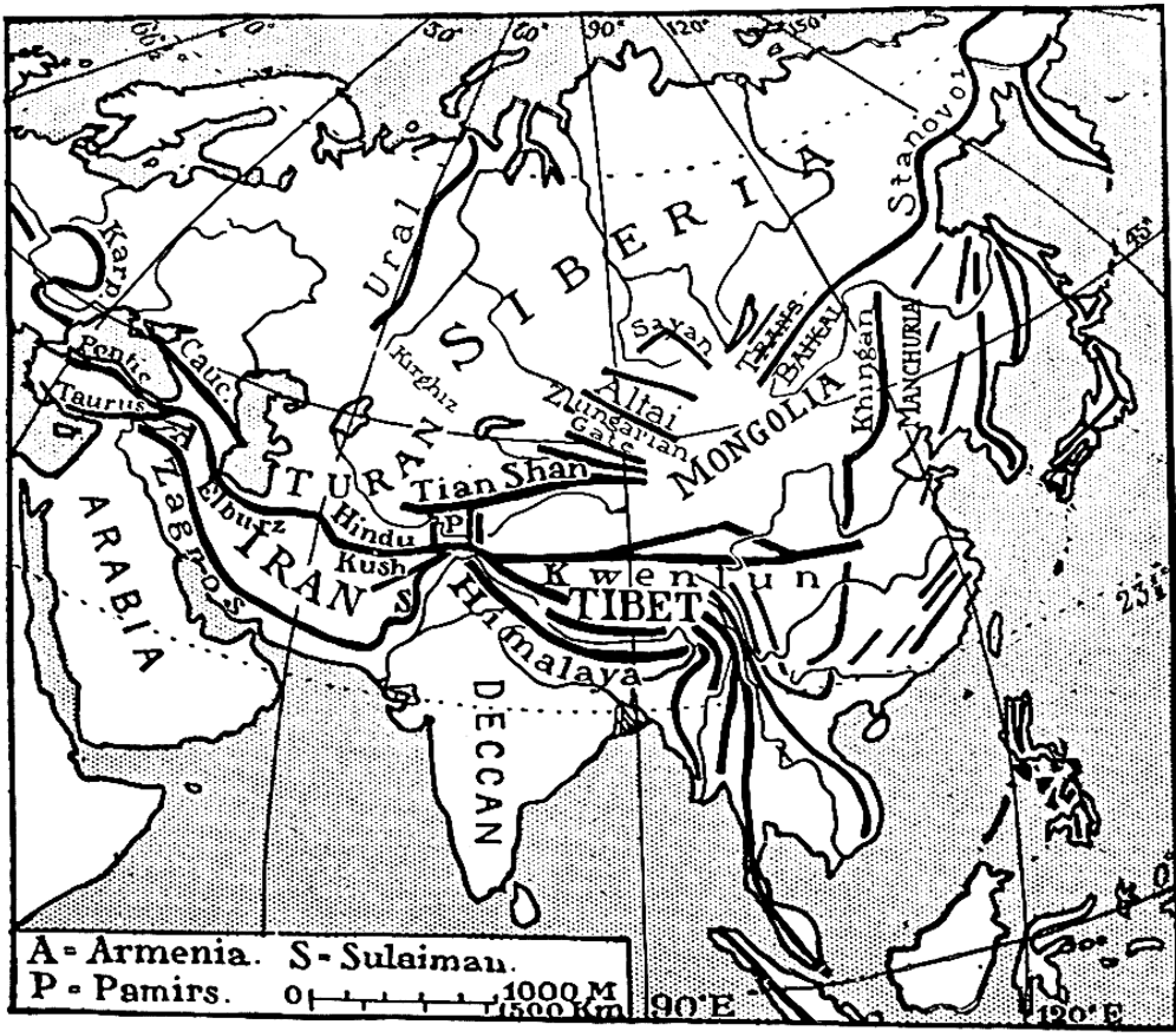

Fig. 3. Key to Relief of Asia.

651. We can trace more or less clearly three main lines. The peninsula of Asia Minor, which rises high above the Eastern Mediterranean and the Black Sea, is a high plateau enclosed between the Pontic Mountains which sink steeply to the Black Sea and the

Taurus Mountains which fall steeply to the Mediterranean. These two lines of height converge to the Armenian Highlands and can be traced eastwards through the Elburz and Hindu Kush Mountains north of Iran, and the Zagros and Suleiman Mountains south of it. These lines again converge in the high Pamirs, a name which means 'The Roof of the World'. A third line of heights is represented by the Caucasus.

652. East of the Pamirs three great mountain systems diverge eastwards. The most northerly is the Tian Shan or Celestial Mountains. The second or central chain is the Kwen Lun Mountains. Between the Tian Shan and the Kwen Lun is the Tarim basin, one of a series of depressions between the northern and central chains. In the west the Caspian and Black Seas are still lower depressions, the surface of the Caspian Sea lying 80 feet below the Mediterranean. The third or southern chain forms the Himalayas. High plateaus are enclosed between the central and southern chains. Compare the position of Tibet with that of Iran and Asia Minor.

653. We can thus trace five belts:

(i) A northern line of heights, represented by the Caucasus in the west and the Tian Shan in the east.

(ii) A line of depressions, represented by the Black and Caspian Seas and the Tarim basin.

(iii) A central line of heights, represented by the Pontic Mountains in Asia Minor, the Elburz and Hindu Kush north of Iran, and the Kwen Lun, north of Tibet.

(iv) A line of high plateaus, represented by Asia Minor and Iran in the west, and by Tibet in the east.

(v) A southern line of heights, represented by the Taurus, south of Asia Minor, the Zagros and Sulaiman Mountains south and east of Iran, and the Himalayas south of Tibet.

654. The Northern and Eastern Marginal Highlands. The northern and eastern margins of the Central Highlands have been much worn down and faulted (§87). Their arrangement is consequently less regular. The Altai and Sayan Highlands separate the plains of Siberia from the faulted plateau of Mongolia. Mongolia rises slightly in the east to form the Khingan Mountains, which fall steeply to the much lower plains of Manchuria. The Yablonoi and Stanovoi Highlands, commonly called the Trans-Baikalian Highlands, border the Sea of Okhotsk, and are part of an old worn-down highland. Along the Pacific coast faulting has disturbed the rocks and raised many ranges. These fall gently to the interior but more steeply to the Pacific lowlands. Along the Pacific coast the land has sunk down bodily, forming a chain of seas between the mainland and the outer islands (643b.) Nearly all the islands are volcanic, a sign of weakness in the Earth's crust along this line. Fujisan, the sacred mountain of Japan, is one of the most perfect volcanic cones in the world.

655. Scenery of the Central Mountains. Mountain scenery is affected by many causes (Part I, chaps. viii–x). Among these are the character of the rocks, the way in which the mountains were upraised, the degree in which they have been disturbed by later Earth movements, the length of time they have been denuded, and whether by ice, wind, or running water, &c.

656. The highest chains of the Central Mountains are folded mountains (§ 87), and are recent as we count time in the Earth's history. They were formed in the same way and perhaps during the same period as the Alps, with which they are connected. Probably they are still slowly rising, but they are also being slowly worn down by denudation. The Caucasus resemble the Alps on a larger scale. Elbruz (over 18,000 feet), the highest peak, is one of several extinct volcanoes. The broad high precipitous Hindu Kush are cut by deep inaccessible valleys. The Himalayas rise like a wall above the lowlands of Northern India. Range rises behind range with deep river gorges between. Alpine scenery is found in the Himalayas on a gigantic scale. The forests are more

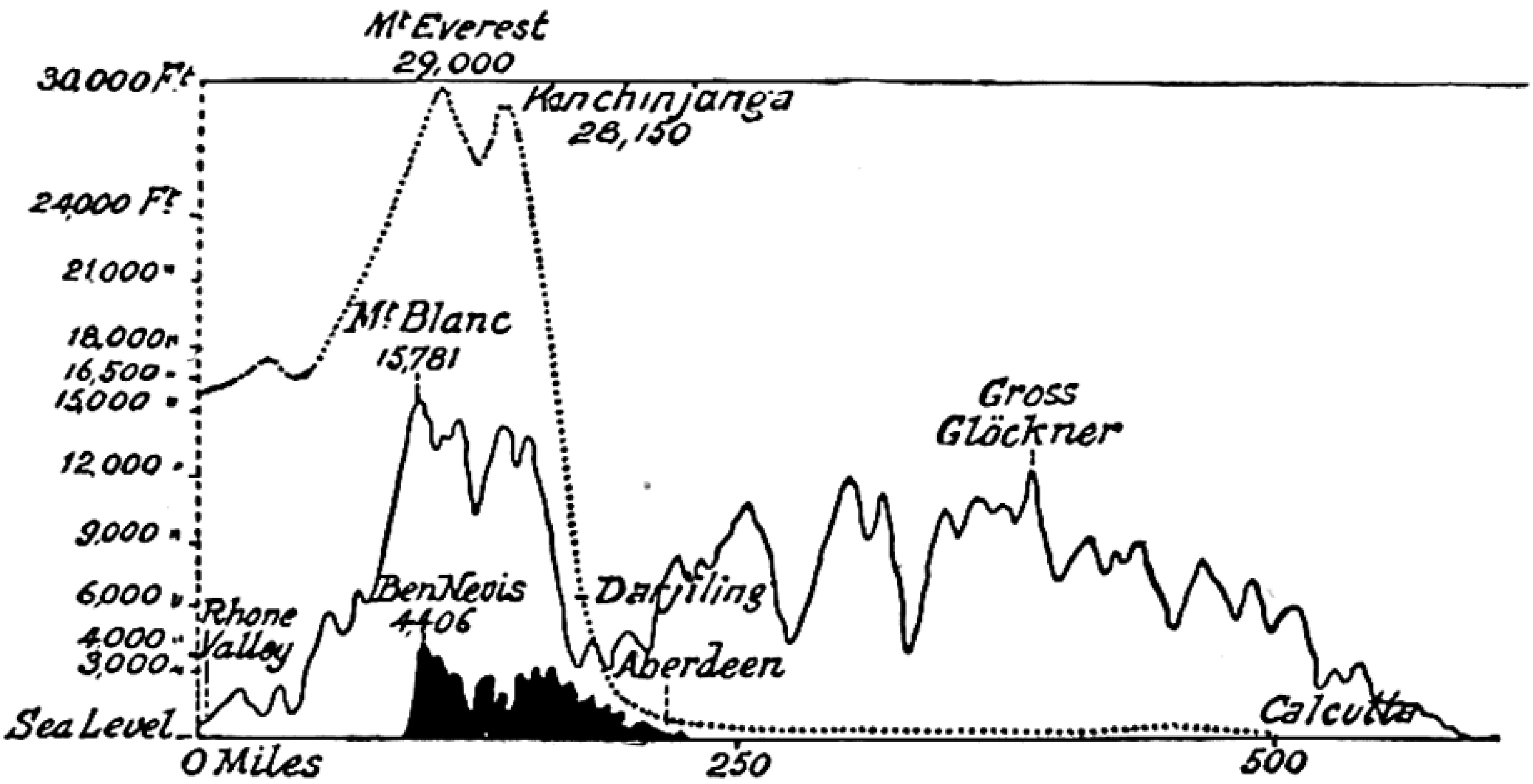

Fig. 4. Comparative Height of the Himalayas, Alps, and Scottish Highlands.

dense and varied, the precipices more stupendous, the gorges sheerer and more profound, the rivers which rush through them more terrific in strength and volume, the glaciers and snow-fields enormously vaster, the snow peaks far higher and more dazzlingly beautiful. By forests, gorges, and high valleys travellers climb to passes three or four miles high and descend to the plateau of Tibet. These passes are the lowest points in the ranges, and the snow peaks rise a mile or two higher still. Fig. 4 shows the comparative height of the Scottish Highlands, the Alps, and the Himalayas.

Colour each outline differently to make the diagram clearer. Everest (29,000 feet), the highest mountain in the world, is between five and six miles high. Little is known of the Kwen Lun and Tian Shan or of the forested mountains of Indo-China.

657. The high dry plateaus between the southern and central chains are rugged lands crossed by heights. Most of the erosion is done by wind. Wild gales and snow-storms rage unceasingly over the high plateau of Tibet, which lies about three miles above the sea. Agriculture is only possible in the lowest and most sheltered valleys of the south. Salt or stony or sandy deserts are found in Iran and Asia Minor.

658. Wind erosion is also very important in the Tarim basin and in the Gobi desert of Mongolia. The heavier particles are dropped first and are worn down, driven on, and piled up as sand dunes. The finest particles are carried farthest and are piled up in thick deposits in the valleys and lowlands of Northern China.

659. The scenery of the Northern and Eastern Highlands is less imposing than that of the younger mountains already described. The heights are gently rounded, and along the margin steep scarps show that whole blocks of the Earth's crust have been violently forced upwards. The scenery is more like that of the Central Highlands of Europe than that of the Alps or the Himalayas.

660. The Rivers. The longest rivers of Asia flow from the snows of the Central Mountains and cross the surrounding lowlands to the Arctic, Pacific, and Indian Oceans. No long rivers reach the Mediterranean. The upper course of all these rivers is through mountain gorges between lofty rock walls. Some of the river courses are probably older than the present mountains, and these gorges have been deepened by the rising of the land as well as by the cutting down of the river bed. In the wetter regions the rivers have perhaps cut back their present upper courses through the ranges in which they first rose (§§ 99–101). All the rivers carry down much rock waste and spread it out over the lowlands when the melting snows flood the rivers.

661. On the coloured map find the rivers which flow to the Arctic Ocean across the Siberian lowland. These are the Ob (3,230 miles), with its great feeder the Irtish (2,300 miles) in the west; the Yenisei (2,500 miles), from the Altai and Sayan Mountains; and the Lena (2,860 miles), from the Trans-Baikalian Highlands. A large wall map shows that the main streams flow north and receive long tributaries from east and west. These often rise very near each other and form important natural routes from west to east. The Russian fur traders who first followed them laid the foundation of Russia's great Asiatic empire.

662. Two long rivers are fed by the snows and glaciers of the Hindu Kush, the Pamirs, and the Tian Shan. These are the Oxus or Amu Darya (1,500 miles) and the Syr Darya. After descending in wild gorges they widen to high but fertile vales. Their lower courses are across the dry lowland of Turan, where so much of their water is used for irrigation that they enter the Aral Sea with greatly diminished volume.

663. Two famous rivers rise in the Armenian Highlands and cross the lowlands of Mesopotamia to the Persian Gulf. These are the Euphrates (1,600 miles) and its tributary the Tigris (1,150 miles), both familiar in the Bible story.

664. The Himalayan snows give birth to the Indus (2,000 miles), the Ganges (1,460 miles), and the Tsan-po or Brahmaputra (1,800 miles), and their innumerable tributaries. The Indus breaks through the outer ranges of the Himalayas, gathers up the waters of five great Punjab tributaries, and flows westwards across a dry region to the Arabian Sea. The gorges of the upper Indus and its tributaries are probably the most magnificent in the world. The Brahmaputra rises near the Indus behind the southern ranges of the Himalayas, but flows in the opposite direction (§ 810), breaks through the outer ranges, and descends the steep forested slopes of Assâm to a delta at the head of the Bay of Bengal. The Ganges, the sacred river of India, rises in the same region, breaks through the outer ranges, unites with many tributaries, and crosses the lowlands of Bengal to the same delta.

665. Many rivers rise in Southern Tibet and flow in steep and densely forested gorges to the lowlands of Indo-China. Their almost parallel valleys are separated by densely forested and little-known ranges running south from the Central Mountains. The lower course of the Irawadi (1,300 miles) and Salwen (1,750) miles form the lowland of Burma. The Lower Menam (750 miles) forms the lowlands of Siam, the Mekong (2,600 miles) Cambodia, and the Red River Tongking.

666. Three long and many shorter rivers flow eastwards to the Pacific. The Amur (2,700 miles) in the north flows from the Trans-Baikalian Highlands to the Sea of Okhotsk, separating Siberia from Manchuria. The Hwang-ho (2,300 miles) or Yellow River and the Yangtse-kiang (3,000 miles) rise in Eastern Tibet in the glaciers of the Kwen Lun. They descend in wild gorges, break through the ranges of the Eastern Highlands, and cross the rich lowlands of China to the Pacific.

667. River Floods. All these rivers wear down the rocks of the Central Mountains, and in their yearly floods spread their waste over the lowlands at their base. Do not forget that though we call floods destructive because they destroy life and property, they are also constructive and increase the agricultural lowlands. The deep rich alluvial soil which feeds millions in China, Indo-China, and India, has been brought down by river floods. All rivers vary in volume at different seasons, especially in Asia. They are fullest when the high snows melt in spring and early summer and lowest in autumn. Those of the drier regions carry hardly any water except in the spring months. The Siberian rivers are frozen in winter, and the lower reaches remain frozen long after the ice melts in the upper reaches. The waters spread over the surrounding country, and the flooded area moves north as the season advances. The Amur is also frozen in winter and flooded in spring. The rivers of Turan are not allowed to flood the cultivated lands, to which their water is distributed by irrigation canals. The Indus and Ganges are much swollen when the snows melt in the high Himalayas and during the rains, and immense sums of money have been spent in regulating their courses, and cutting irrigation canals. In China much attention is also paid to irrigation in order to prevent floods and to increase the cultivated land. The floods of the Hwang-ho are so disastrous that the river is often called China's sorrow. In its lower course it is embanked, and its bed winds across the lowlands like a railway embankment. If the embankments give way the river pours down over the lower land, and makes a new course as its water goes down. Before 1887 it entered the Yellow Sea south of the Shantung Peninsula. In that year it burst its banks, drowned a million people, and now enters the sea north of the peninsula. The Yangtse is also liable to floods (§ 872).

668. The Central Mountains as a Barrier. The height and breadth of the Central Mountains make them a barrier in every sense. Different climates, plants, animals, occupations, races, religions, and civilizations are found north, south, and east of them. They keep off the cold winds from the southern lowlands, but they also prevent warm or wet winds from reaching Central Asia. The routes across their broadest and highest part are long and difficult, and caravans of men and animals are many months on the road. Pass after pass has to be crossed, and many of these are higher than the summit of Mont Blanc. Nevertheless a steady trade goes on in tea and other luxuries.

Exercises

1. Draw a diagrammatic map of the Central Mountains of Asia. Insert and name the Amur, Euphrates, Ganges, Hwang-ho, Indus, Mekong, Ob, Oxus, and Yangtse.

2. Why do several political frontiers meet in (*a*) the Armenian Highlands and (*b*) the Pamirs? Give as fully as you can the geographical explanation.

3. Give some account of erosion in the Central Mountains, and show what becomes of the rock waste.

4. How far are the rivers of Asia useful as routes? What are the chief hindrances to their use? Give examples if you can.

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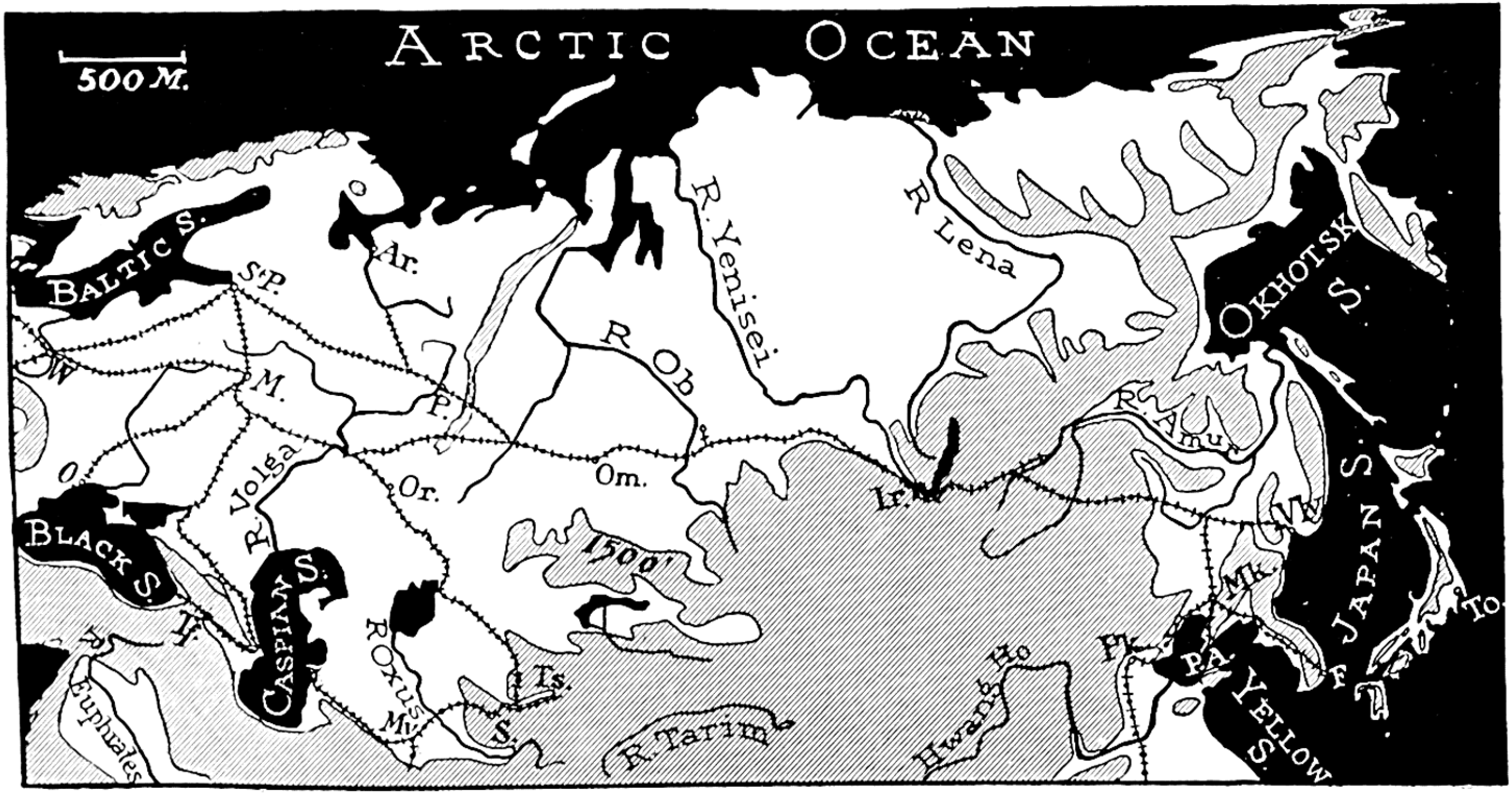


Fig. 5. Chief Railways crossing the Lowlands of Northern Eurasia.

CHAPTER III

LOWLANDS AND TABLELANDS

669. The Siberian Lowland. Siberia, the largest lowland of Asia, stretches northwards from the Central Mountains to the shores of the Arctic Ocean. In the west it continues the plains of Russia. In the east it is a very old land worn down to a peneplain (§ 136). In Western Siberia the sedimentary rocks are covered with alluvium, and the slope is so slight that the land is swampy and easily flooded. Across this region the sluggish Ob creeps to the Arctic Ocean. Eastern Siberia is a low platform of sedimentary rock which has weathered irregularly. It is higher, better drained, and less uniformly covered with alluvium. The Yenisei flows northwards across it, receiving the Angara from Lake Baikal. Notice the long narrow shape of this lake, which lies in what is called a rift valley. Rift valleys are formed by the sinking down of masses of the Earth's crust between two lines of weakness. They have a characteristic long narrow shape, with higher ground shutting them in. East of the Yenisei the Lena crosses the narrowest part of the lowland.

669a. The height of the Siberian lowland varies greatly. The lowest part forms Turan (§ 670). The highest part of the Siberian lowland is about 1,700 feet high.

669b. The Central Lowland of Scotland is an example of a rift valley in our own country. Other examples in Asia are the long narrow Red Sea, the Jordan Valley, and the Dead Sea.

669c. Lake Baikal separates the Altai and Sayan Highlands from the Trans-Baikalian Highlands.

670. Turan. Turan is the south-western extension of the Siberian lowland, but is in a different climatic belt. It is a continuation of the semi-desert lowlands round the Caspian Sea. The Syr and Amu flow to the

Sea of Aral, which occupies a depression in the centre, but the shorter ones disappear before reaching it. The Sea of Aral has no outlet to the ocean, and forms a basin of inland drainage (§ 135). Such inland drainage basins are common in the drier parts of Asia. Where it can be irrigated Turan is fertile (§§ 789–93).

670a. The Sea of Aral is about 160 feet higher than the Black Sea, and 240 feet higher than the Caspian Sea, which is more than 80 feet below the level of the Black Sea.

671. The Southern Lowlands. A number of lowlands have been built up, chiefly of alluvium, between the base of the Central Mountains and the Southern Tablelands. Mesopotamia is drained to the Persian Gulf by the Euphrates and the Tigris. Here the Bible story places the Garden of Eden, the symbol of natural fertility. The agricultural empires of Nineveh and Babylon grew up on these irrigated lands, and were highly civilized. Incessant warfare and unsettled government has led to the neglect of irrigation and the ruin of the country.

672. The lowlands of Northern India lie between the Central Mountains and the Tableland of the Deccan. They are drained to the Arabian Gulf by the Indus, and to the Bay of Bengal by the Ganges and Brahmaputra. The western half is a dry region, but Bengal is fertile.

673. The Eastern Lowlands. These include the lowlands of Indo-China (§ 884) and China. All are very fertile, but agriculture is carried to higher perfection in China than in Indo-China. The Yangtse lowland has a fertile red sandstone soil. Irrigation is practised on a great scale, and the hills are terraced and cultivated to their summits. The basin of the Hwang-ho in Northern China is partly covered with a yellow soil, called loess, blown by the winds from the higher lands of Mongolia. In the lower Hwang-ho basin the soil is alluvium.

674. The Southern Tablelands. The southern tablelands, Arabia and the Deccan, consist of old rocks, lying almost level. They were once part of a continent (§ 904) which united Africa to Australia. Great subsidences in the Earth's crust formed the present oceans and gulfs, and left the tablelands of Africa, Arabia, the Deccan, and Australia as high upstanding masses of hard rock.

675. Both Arabia and the Deccan are highest in the west and slope eastwards. The western part of Arabia is covered with scanty pasture, but deep, steep, fertile valleys open to the sea. Farther east are sandy deserts, with scattered oases. A narrow infertile lowland borders the east coast and widens to Mesopotamia.

676. The high western margin of the Deccan rises as the Western Ghats above a narrow coastal plain. Ghat, an Indian word meaning a staircase, describes the appearance of the edge of the tableland from below. The southern Deccan forms the Nilgiri and Cardamom Hills, and the lower eastern margin sinks to the Bay of Bengal as the Eastern Ghats. The longest rivers flow east, with the exception of the Narbada and Tapti.

Exercises

1. Describe briefly the chief differences between the lowlands of (*a*) Siberia, (*b*) Turan, (*c*) Mesopotamia, and (*d*) China. How do these differences affect the density of population?

2. Draw a map of the railways connecting Russian Asia and Russian Europe.

3. Explain the terms *basin of inland drainage*, *peneplain*, *escarpment*, *alluvial lowland*, *oasis*. Give examples of each in Asia.

CHAPTER IV

THE CLIMATE OF ASIA

677. Two causes give Asia a great range of climate. The first is its extension in latitude, from within a few hundred miles of the North Pole to the equator. The second is its elevation, which varies from sea-level to a height of between 5 and 6 miles.

678. In studying the climate of Europe, and particularly of Britain, we saw that the warm moist Atlantic winds gave Western Europe an equable climate and an abundant rainfall. Eastern Europe had a much more extreme climate and a much more scanty rainfall. These conditions become still more marked in Asia.

679. In Fig. 1 the centre of the circle is in the Mongolian plateau, which is almost 2,000 miles from any sea. The greater part of Asia is remote from all the seas which wash its coast.

680. Fig. 6 shows the isotherms for January, the coldest month. Trace the curve of the isotherm of 32° F., the freezing-point. It follows the western coast of Norway southwards, crosses Central Europe and the Black and Caspian Seas and the extreme south of Central Asia, and does not bend north till it reaches the eastern coast, where the northward curve across Korea and Japan shows the influence of the Pacific Ocean. In the north-east, there is a region of intense cold, where the average January temperature is under −40° F. (72° below freezing-point). Trace the isotherms of 50° F. and 60° F., which also bend north along the Pacific coast.

681. Remember that in this map allowance has been made for the difference of height. The direction of the isotherms shows what the temperature would be if the whole continent were at sea-level (§ 48). Places at a high elevation have a more severe temperature in winter than the map actually shows.

682. The isotherm of 32° F. is very important. Many

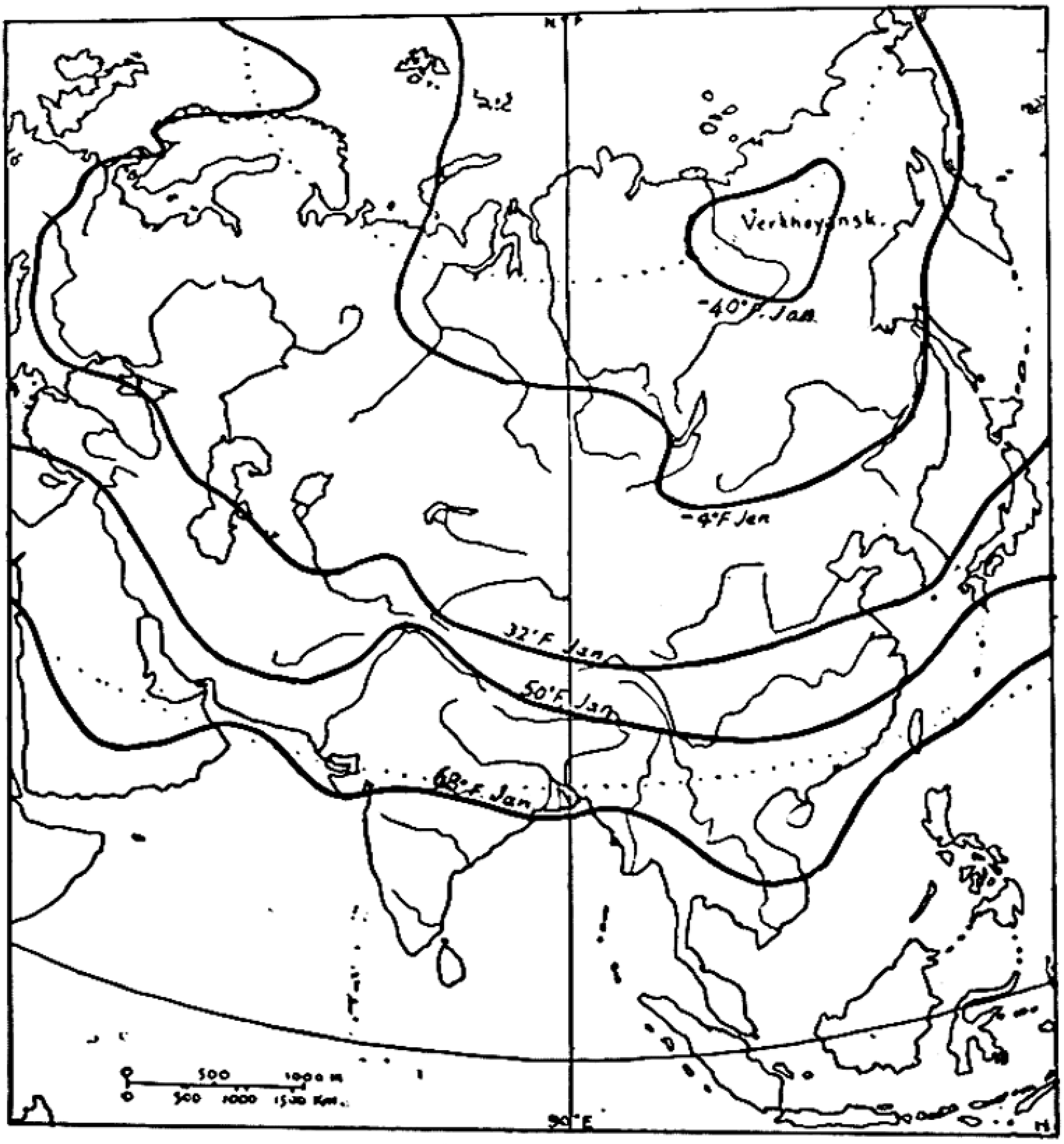


Fig. 6. January Isotherms of Asia.

plants cannot be grown where there are severe winter frosts, though the summers may be warm enough for them. Colour this isotherm blue in the diagram. All places north of it have long winter frosts of varying severity and duration. Only the south and east of the continent are free from frost in January.

683. Next take the isotherms for July in Fig. 7. As in Europe, they follow the parallels of latitude much more closely than the winter isotherms. Most of Asia has a mean July temperature of 80° F. or over. In July the north of Siberia is as warm as France, except near the Arctic Ocean. The hottest summers are in Iran and Arabia. These are shown in the rainfall maps as dry regions, and there is no screen of cloud to make the summer heat less intense. Southern India and Indo-China, though in lower latitudes, have cooler summers

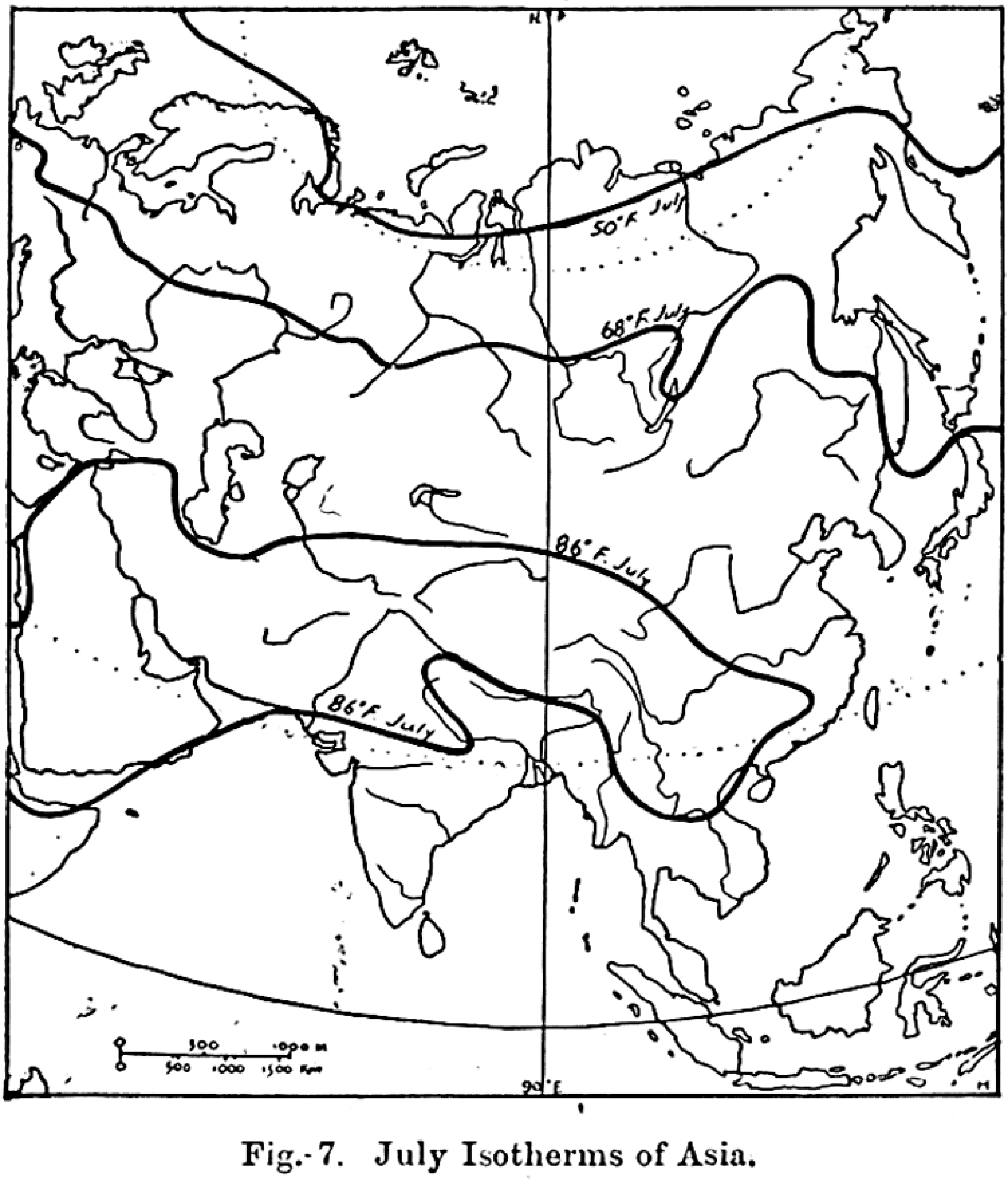


Fig. 7. July Isotherms of Asia.

than these dry plateaus. This is due to the influence of the Indian Ocean. The influence of the Pacific Ocean is shown by the way in which the July isotherms bend south along the Pacific coast.

684. Let us now take some actual figures. Weather observations have not been made in Asia as long as in Europe, and there are comparatively few stations. The observations given below show the influence of (i) latitude; (ii) distance from the sea, and particularly from the Atlantic; (iii) elevation; and (iv) local conditions. By local conditions are meant such special circumstances as a sheltered situation in a valley, protected from colder winds, or a situation exposed to particularly cold winds.

Place.	Latitude N.	Longitude E.	Height in feet.	Temperature, Coldest Month. Fahrenheit.	Temperature, Hottest Month. Fahrenheit.
Verkoyansk	67° 33′	133° 24′	330	−58·9	59·7
Tobolsk	58° 12′	68° 14′	345	− 2·2	66·4
Irkutsk	52° 16′	104° 19′	1,610	− 5·5	65·1
Semipalatinsk	50° 24′	80° 13′	590	0·5	72·0
Blagovestchyensk	50° 15′	127° 38′	360	−13·7	70·3
Vladivostok	43° 07′	131° 34′	50	4·8	69·4
Tiflis	41° 43′	44° 48′	1,345	32·4	76·1
Peking	39° 57′	116° 28′	130	23·5	78·8
Samarkand	39° 34′	66° 57′	2,360	32·2	77·9
Tientsin	39° 10′	117° 10′	15	25·2	78·6
Pamirski Post	38° 11′	74° 2′	11,940	− 1·1	57·0
Tokio	35° 41′	139° 41′	65	37·2	77·7
Kabul	34° 30′	69° 18′	6,235	31·6	76·6
Hankow	30° 35′	114° 17′	—	38·8	83·5
Bushire	29° 00′	49° 50′	25	57·6	89·4
Calcutta	22° 32′	88° 24′	20	65·1	85·6
Bombay	18° 55′	72° 54′	35	74·5	84·6
Rangoon	16° 47′	96° 13′	40	74·7	85·0
Madras	13° 04′	80° 14′	10	75·4	88·7
Colombo	6° 56′	79° 56′	40	79·0	82[illegible]
Singapore	1° 17′	103° 05′	10	78·3	81·5

685. Verkoyansk is in the coldest part of Siberia and has the coldest winter recorded in any part of the world. The range of temperature is nearly 120°.

686. The Siberian lowland would in any case have had a cold winter, because it lies in high latitudes and is remote from the sea, but a third cause makes the winter cold still more intense. Siberia lies open to the north and to the winds which blow from the polar ice, while a mountain barrier shuts off warmer winds from the south.

687. The second group of places is in the latitude of England. Notice that Tobolsk and Semipalatinsk in the west have milder winters than Irkutsk and Blagovestchyensk in the east, but much more severe ones than places in the same latitude in Britain or Western Europe. Irkutsk has a cooler summer than Tobolsk, but it is 1,300 feet higher. Blagovestchyensk has a cooler summer than Semipalatinsk, which is in a more open situation. Such local conditions often explain a figure which seems too high or too low.

688. The next group of stations is in the latitude of Southern France and the Mediterranean peninsulas. Samarkand and Peking are in latitudes between those of Naples and Lisbon. The winters are cold, especially at Pamirski Post on the Pamirs, two miles above the sea. Notice that Tientsin has rather warmer winters than Peking (§ 692), owing to the influence of the Pacific. Except at Pamirski Post, the summer temperature of all these places differs little.

689. Hankow and Bushire are almost in the latitude of Cairo in Egypt. Bushire is much warmer in winter than Hankow, partly because it lies farther west, and partly because it is sheltered on the north and open on the south.

690. The last group of places are between the tropic and the equator. Their winters are warm and their summers very hot. Calcutta, just south of the tropic, shows a marked difference between the January and July temperature, but elsewhere January is nearly as warm as July.

691. This table shows that the severity of the winters increases from east to west; that is, the isotherms do not correspond with the parallels of latitude. If we take the summer temperatures only we get a different result. Allowing for elevation, the summer temperature increases almost uniformly towards the equator; or, in other words, the summer isotherms correspond more closely with the parallels of latitude.

692. Winds of Asia. The land becomes intensely heated during the hot summers and the air rises. This forms a number of low-pressure areas (§ 55) over the land in summer. Cooler, heavier air is drawn in from over the surrounding oceans, over which the pressure is higher. The summer winds are inflowing winds, and tend to bring rain to the high margins of the continent. In winter the land is cooled and low-pressure areas form over it, and especially over Central Asia. The winter winds blow outwards towards the areas of lower pressure over the warmer seas, and are dry winds. Peking, at no great distance from the Pacific, lies in the tract of cold winds blowing outwards from the cold Mongolian plateau. This explains why its winter is so cold though it is near the sea.

693. Distribution of Rainfall. Fig. 8 gives the mean annual rainfall of Asia. Notice the great areas of dry country which are left white in the map. If we compare this map with the relief map we shall find that some of these dry regions are high. They lie in the lee of high lands which have already received the moisture brought by the prevailing winds.

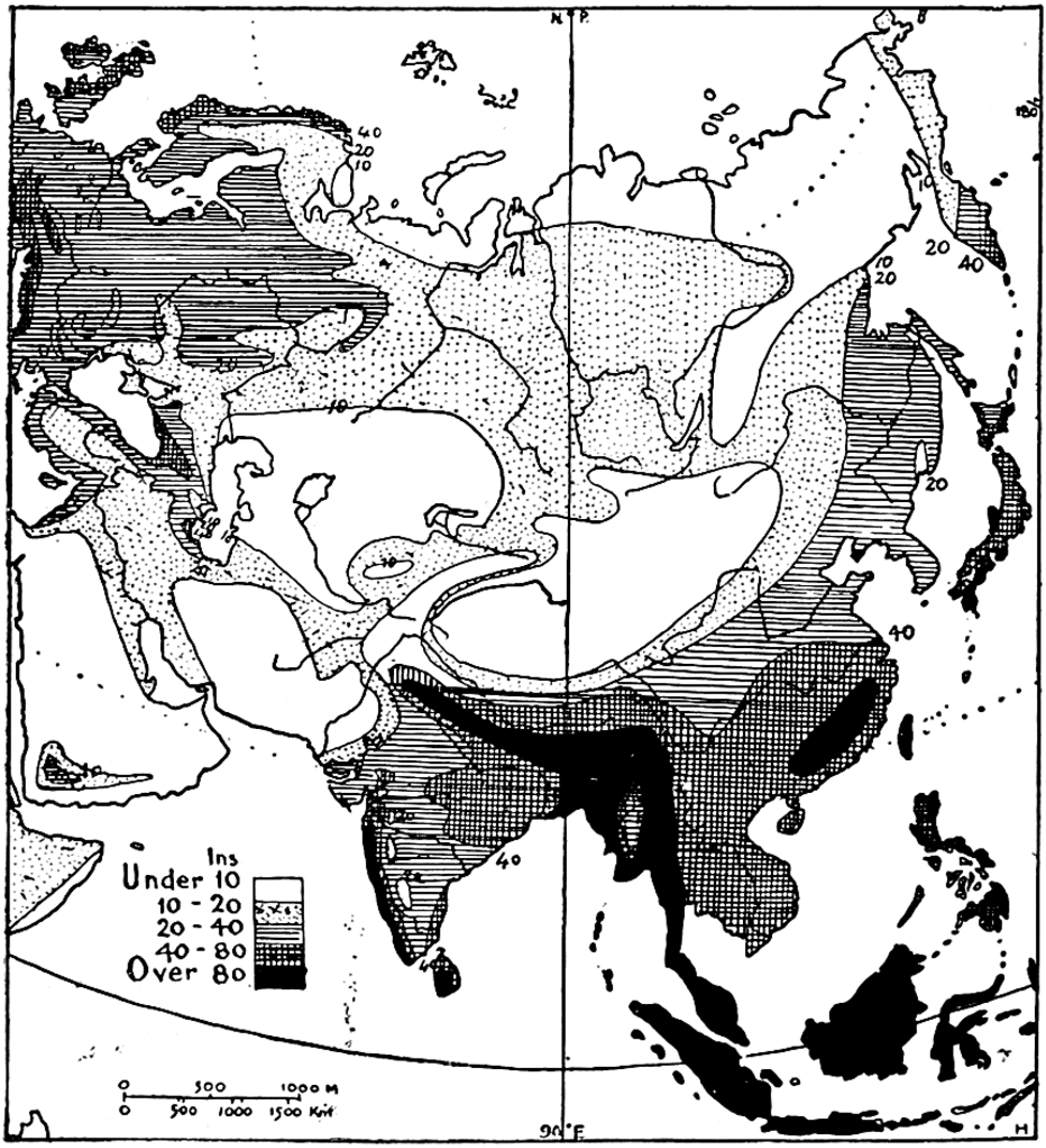


Fig. 8. Mean Annual Rainfall of Asia.

694. The black patches show the regions with the heaviest rainfall. Some are in the equatorial wet belt. The others are explained by the coloured relief map.

695. The mean annual rainfall is less important than its seasonal distribution. The map in Fig. 9 is ruled to show the seasons at which rain falls. The greater part of Asia has summer rains. This is because the summer winds are inflowing winds which have blown over the

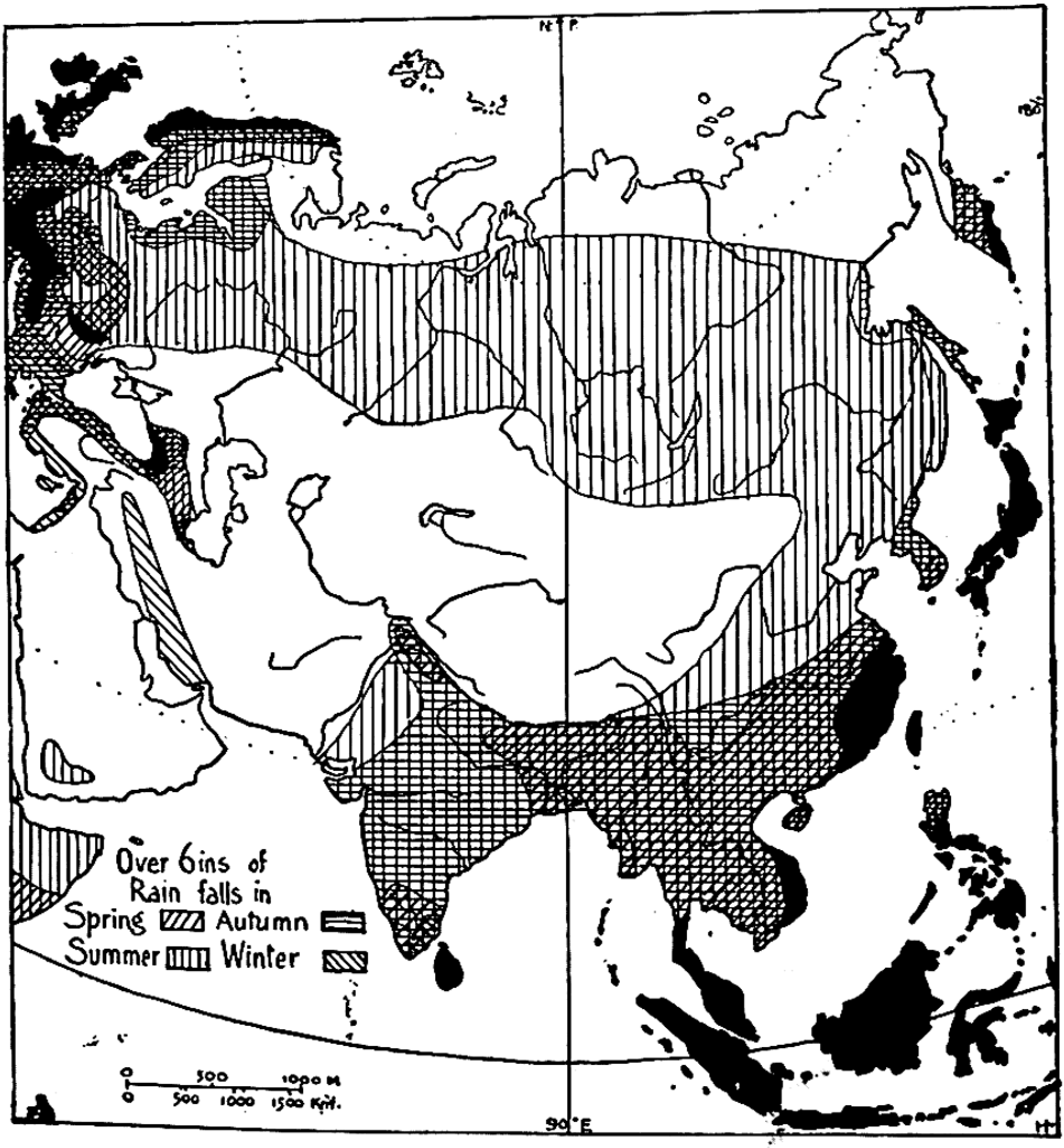


Fig. 9. Seasonal Rainfall of Asia.

oceans. They part with most of their moisture on the first high ranges in their track and pass on as dry winds. No inflowing winds cross the mountain barrier which shuts in Central Asia, and this region is always dry.

696. A small part of Asia has winter rains only, giving it a Mediterranean climate (§§ 70, 603). The scanty winter rains of Asia Minor and Iran are brought by the prevailing westerlies, which blow farthest towards the equator in winter. Japan has winter rains, for it lies in the track of cyclonic storms similar to those which blow in the Atlantic in winter (§ 58). It also receives summer rains.

697. Monsoon Winds and Rains. The sea-breezes which blow at the seaside on summer afternoons are inflowing winds on a small scale. The inflowing winds which bring summer rains to Asia are sea-breezes on a vast scale. They are called monsoons, a name which means a seasonal wind. As they blow only at certain seasons the people of the monsoon lands count on rain at those seasons and store water against the dry season. If the monsoon is much below the average famine follows.

698. The monsoon winds blow from the south-west over the Indian Ocean, but the direction in which they blow over the land is affected by the trend of the coast and the lie of the mountains and valleys. The monsoon winds which pour out their rains on the Western Ghats blow from the south-west, but the winds which bring rain to Bengal blow from the south-east. They are drier when they reach the Punjab, and they blow there for a shorter time, so that the Punjab is much drier than Bengal. They do not reach the lower Indus at all. Again, they blow on the west coast of Indo-China as south-west winds, but on the eastern coasts of Asia as south-east winds. Violent thunderstorms and rains occur when the monsoon breaks.

698a. These outflowing winter winds are part of the trade-wind system, and are dry except where they strike high eastern coasts or mountain slopes in their track. They blow farthest towards the equator in winter when the pressure over the land is highest. Some writers explain the summer monsoon winds as being the trade winds of the southern hemisphere drawn across the equator as the sun moves north, and rendered moist by evaporation as they cross the oceans.

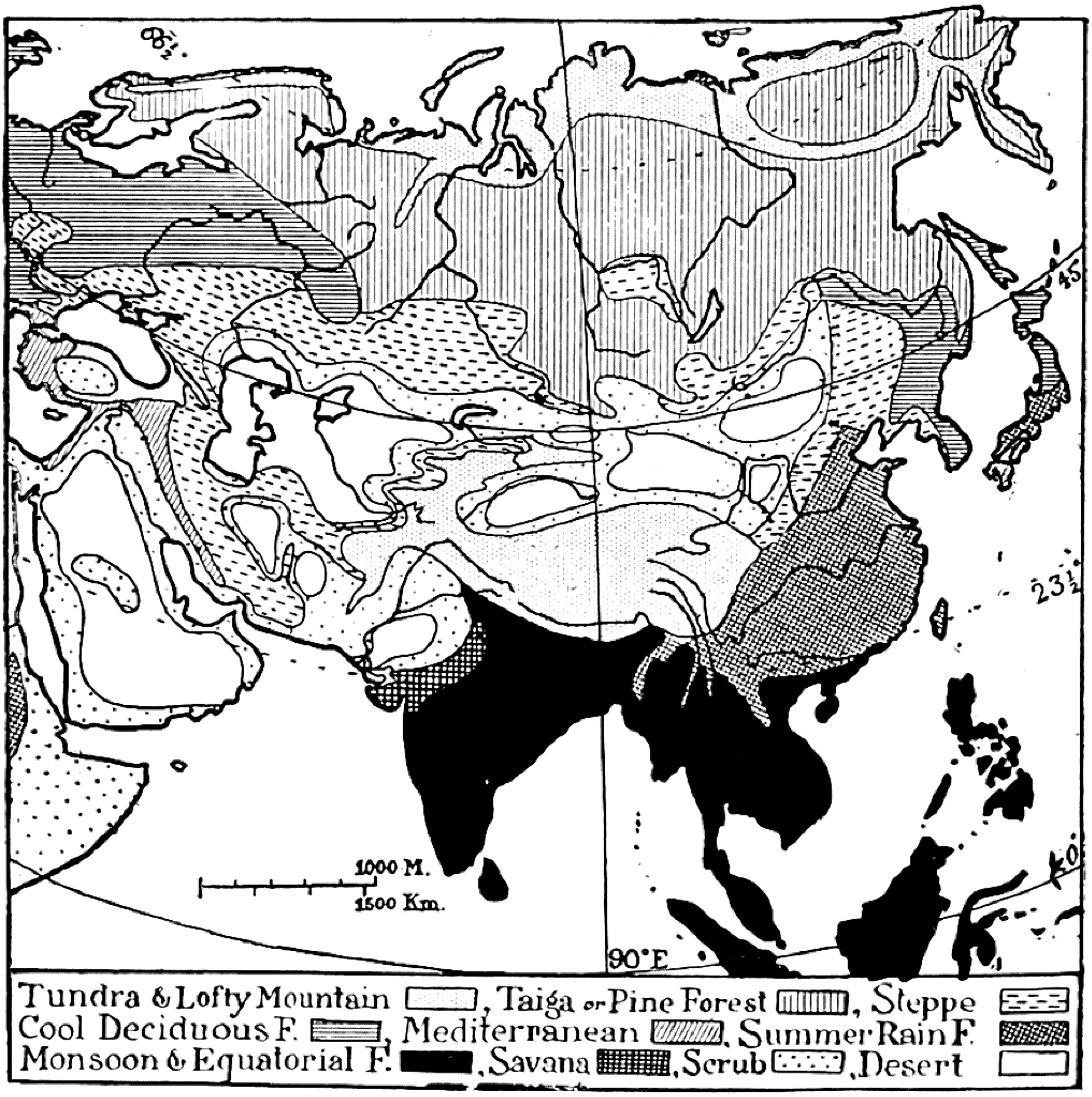
698b. The actual rainfall is much greater in many places than the maximum shown on the map. At Cherrapunji, a station in the Khasi Hills of Assam, the mean annual rainfall is 475 inches a year. In very wet years 600 inches have fallen, and on one occasion 40 inches of rain fell in a single day.

699. Tropical Climates. The figures in § 685 show that there is very little difference between the temperature of the summer and winter months. Day and night are nearly equal in length throughout the year, and there is no great difference between the heat of day and night. Near the equator rain falls at all seasons, but most at the equinoxes. The year is thus divided into two relatively wet and two relatively dry seasons. In places farther from the equator there is a well-marked wet summer season and a well-marked dry winter one.

700. Colombo is less than seven degrees from the equator. The wettest months are May or June, when the sun is moving northwards to the summer solstice, and October or November, when it is moving southwards towards the winter solstice. May is the hottest month, but in autumn the retreating monsoon brings a screen of cloud and reduces the temperature. Ceylon is an island, and its climate is modified by the influence of the sea.

Exercises

1. Arrange the figures given in § 683 in order of longitude. Does the new table show any relation between longitude and climate? Explain fully what it seems to be.
2. Mark on an outline map the isotherms for both January and July. Shade the regions with the greatest range of temperature.
3. Draw a map of Asia showing the regions which receive summer rains. How are these caused?
4. Describe the daily and seasonal changes in lands with a tropical climate. Account for them.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Tundra & Lofty Mountain ▭, Taiga or Pine Forest ▥, Steppe ▤
Cool Deciduous F. ▤, Mediterranean ▨, Summer Rain F. ▦
Monsoon & Equatorial F. ■, Savana ▦, Scrub ▭, Desert ▭

Fig. 10. The Natural Vegetation of Asia.

This map should be compared with that showing the natural vegetation of Europe (Vol. I. Part III, Fig. 113), and also with that showing the natural vegetation of North America (Vol. II, Part VI, Fig. 82).

CHAPTER V

PLANTS, ANIMALS, AND MAN

701. Natural Vegetation Belts. These correspond closely with those of Europe (§ 499).

A. (i) The Tundra.

B. The Forests:

(ii) The northern coniferous forest.

(iii) Deciduous woods which shed their leaves in winter.

(iv) The evergreen forests of the Mediterranean lands with winter rains.

(v) The evergreen forests of the eastern lands with summer rains.

(vi) The tropical forests of Southern Asia.

C. The treeless lands:

(vii) The steppes and grasslands of Siberia, Turan, Manchuria, and the high plateaus.

(viii) The scrub lands and deserts.

(ix) The monsoon lowlands.

D. (x) The mountain region, with vegetation of different types at different heights, passing into eternal snow.

702. Comparing these with the divisions in Europe (§ 499) we see that neither the eastern evergreen forests with summer rains, the tropical forests, nor the hot monsoon lowlands are found in Europe. The other regions are on a much greater scale than in Europe.

703. Fig. 10 shows that the tundra is much more extensive than in Europe. It has two seasons only, a long dark winter when plants rest, and a short summer of almost unbroken daylight when they grow with great intensity. The frozen surface melts in spring and wherever the snow disappears plants appear. The level ground is ill-drained and swampy, and plants do best on slopes where the icy water drains away from their roots. Mosses, lichens, and dwarf berry-bearing plants are mixed with brilliant Alpine flowers. Swarms of mosquitoes hover over the swamps; honey bees gather honey from the short-lived flowers; and innumerable birds come north to breed undisturbed.

704. The tundra is the summer home of many animals, but only the reindeer is important to man. Reindeer feed on creamy reindeer moss, and reach it even in winter by scraping away the snow. Along the sea coast they will eat seaweed if other food is scarce. They have been domesticated by wandering tribes, who live partly on reindeer milk and partly on the fish they catch in the rivers, the berries they gather, and such birds and game as they kill. Like all wandering people they live in tents, and these they make of reindeer skins. With the aid of their reindeer the tundra people move easily from place to place, and thus obtain more abundant food. They move southwards as the winter approaches, and northwards again in summer.

705. The Taiga or Northern Coniferous Forest. Taiga is the Russian name for the vast forests which cover much of Siberia. Firs and larches of different kinds are mixed with birches in the north and with deciduous trees in the south. There is little undergrowth or grass, and the forest animals live on the seeds and nuts of trees, on berries, and on twigs and branches. Among them are deer, bears, wolves, lynxes, foxes, squirrels, martens, weasels, and many smaller animals. The tiger, whose home is farther south, is found as far north as Siberia and Korea. The northern forest animals are hunted for the thick furs which protect them against the winter cold. Some turn white in winter and escape because they match the snow in colour, for nature frequently protects animals by making them difficult to see. Forest animals often have striped or dappled coats, which match the shifting colours of the trunks and leaves. The spots of the deer and the stripes of the tiger are examples.

706. The forest region is thinly settled. The first fur hunters pushed into it along the rivers, but left at the end of the hunting season. White settlement only became important with the building of a railway across Siberia at the end of the nineteenth century. The forest provides wood for building houses, and for burning during the long cold winter. Cattle and poultry are kept on the grass which springs up on the cleared ground, and butter and eggs are sent to Europe.

707. Coniferous forests are also found on the colder mountain slopes. The trees differ in different regions. The most famous are the cedars of Lebanon, and the deodars of the Himalayan forests.

708. Deciduous Forests. These consist of oak, elm, beech, chestnut, and less well-known trees. The deciduous forests are found in lower latitudes and at lower heights than the coniferous forests, and are settled sooner than the coniferous forests. Wild animals remain only in the remotest parts, and are replaced by domesticated animals in the valleys.

709. Evergreen Mediterranean Forests. These contain the same trees as the Mediterranean forests of Europe, but have been almost cleared. The tall evergreen cypress is the commonest tree in Mediterranean Asia. The destruction of the forests has lessened the fertility of these lands. The bare soil is easily washed from the steep slopes, and the scanty rain runs off the surface instead of sinking through it. Unirrigated parts are covered with a scrub of dry strong-smelling plants, on which sheep, goats, and camels feed. The irrigated regions produce a great variety of cultivated plants.

710. The Eastern Evergreen Forests. These have their rain in summer, and not, like the Mediterranean forests, in winter. The plants have large, glossy, fleshy leaves, which lose little moisture by evaporation. The magnolia, camphor, laurel, and camellia are common. Much of this region has been cleared and the wild plants and animals replaced by cultivated and domesticated ones.

711. The Tropical Forests. These are not found north of the high mountain barrier which separates the dry interior of Asia from the well-watered monsoon lands. They are most dense in equatorial latitudes which have heat and moisture throughout the year. Palms abound ; and there are many other trees, whose names mean nothing to us. Trees and plants are crowded thickly together, and grow to a great height, and a dense network of creepers spreads out brilliant blossoms far above in the sunlight. There are many delicious fruits, and strangely shaped and coloured orchids are among the flowers. One orchid produces vanilla. There are many spice trees. Some creepers yield a milky juice from which rubber is made. Fireflies flit through these forests at night, and add a strange beauty to them.

712. Farther from the equator the year consists of a well-marked wet and dry season. Trees and plants are specially fitted by thick bark, and feathery leaves and fronds, or by thick fleshy glossy leaves, to live through the dry season. The forests, however, are much more dense than any in temperate lands. Teak, with a hard indestructible wood, is a valuable tree in the forests of the Western Ghats and Upper Burma. It is cut and floated down the rivers as timber is floated down in Scandinavia or Central Europe (§§ 528, 537).

713. Plant food is abundant in the tropical forest all the year round, but many animals find it difficult to penetrate the dense jungles. The most important are either tree-dwellers or huge bulky animals whose weight clears a way for them. Monkeys and apes are tree-dwellers. They have long arms which reach from branch to branch, and they can grip with their toes and tails as ground animals cannot do. Snakes are well-fitted to glide through undergrowth or to climb trees. Birds also suit the forest life. These include many kinds of parrots, often coloured green to match the forest tints (§ 705). Among the bulkier animals are the elephant and the rhinoceros. Huge wild boars are also found. Some animals are vegetarians, feeding on fruits and twigs, while others eat flesh or suck blood. The great orang of Borneo is a fruit-eater. The tiger kills animals and men. There are many blood-sucking insects, and leeches are common in the streams.

714. The tropical forests are not well-suited to man. They are difficult to penetrate, and their innumerable streams are flooded in the wet season. Settlement is chiefly in the river deltas, where rice is grown in the flooded soil, or along the coasts where fishing is important. In Indo-China the houses are often built on piles above the water, and children swim before they walk.

715. The Steppe. The steppes of Asia continue those of Eastern Europe, but are immeasurably vaster. They have cold winters, hot summers, and a scanty summer rainfall, which is sufficient for annual grasses but not for slow-growing trees. In winter the fierce buran wind rages, and whirling snow-storms are common. In spring the melting snow moistens the surface, and the steppe is covered with grass and flowers. Lilies and other bulbs, which store water in their swollen roots, cover vast tracts with gorgeous blossom. The summer winds bring a little rain and plants grow quickly, but fade as the hot dry summer advances. In autumn the steppe is bare, brown, and desolate. Only in the higher parts is the grass still fresh and green. Men and animals move in winter towards the more sheltered parts of the steppe.

716. All our domesticated animals are grass-eaters, and had their home on the Old World steppes. Vast herds of sheep, cattle, and horses are owned by the Kirghiz and other wandering tribes, who follow them from pasture to pasture. Wild horses and asses and huge wild sheep are found in the high steppes and grassy mountain valleys. The two-humped camel comes from the drier steppes. It eats dry thorny salt-desert plants, and is content with brackish water. Its humps store up fat, and it can bear long times of hunger without starving. Nature has protected the fat-tailed sheep in a similar way. Besides these and various fleet wild animals there are creatures which prey on them. The wolf kills the living, and the vulture devours the dead.

717. The steppe-dwellers are wanderers, like their herds, and they are therefore tent-dwellers. Their tents are made of skins, or of wool pressed into felt. Wool and camels' and goats' hair are made into clothing and into carpets and rugs. Tanned hides are made into bottles and other utensils, saddles and bridles, &c. Milk is an important food, and is drunk fresh, or fermented into *kumiss*, or preserved as butter or cheese for winter use. The steppe yields no wood for fuel, and the droppings of animals are dried and burned.

718. A similar life is lived in the high valleys of the mountain region. The Kirghiz herdsmen drive their flocks to the higher pastures in summer, both to escape

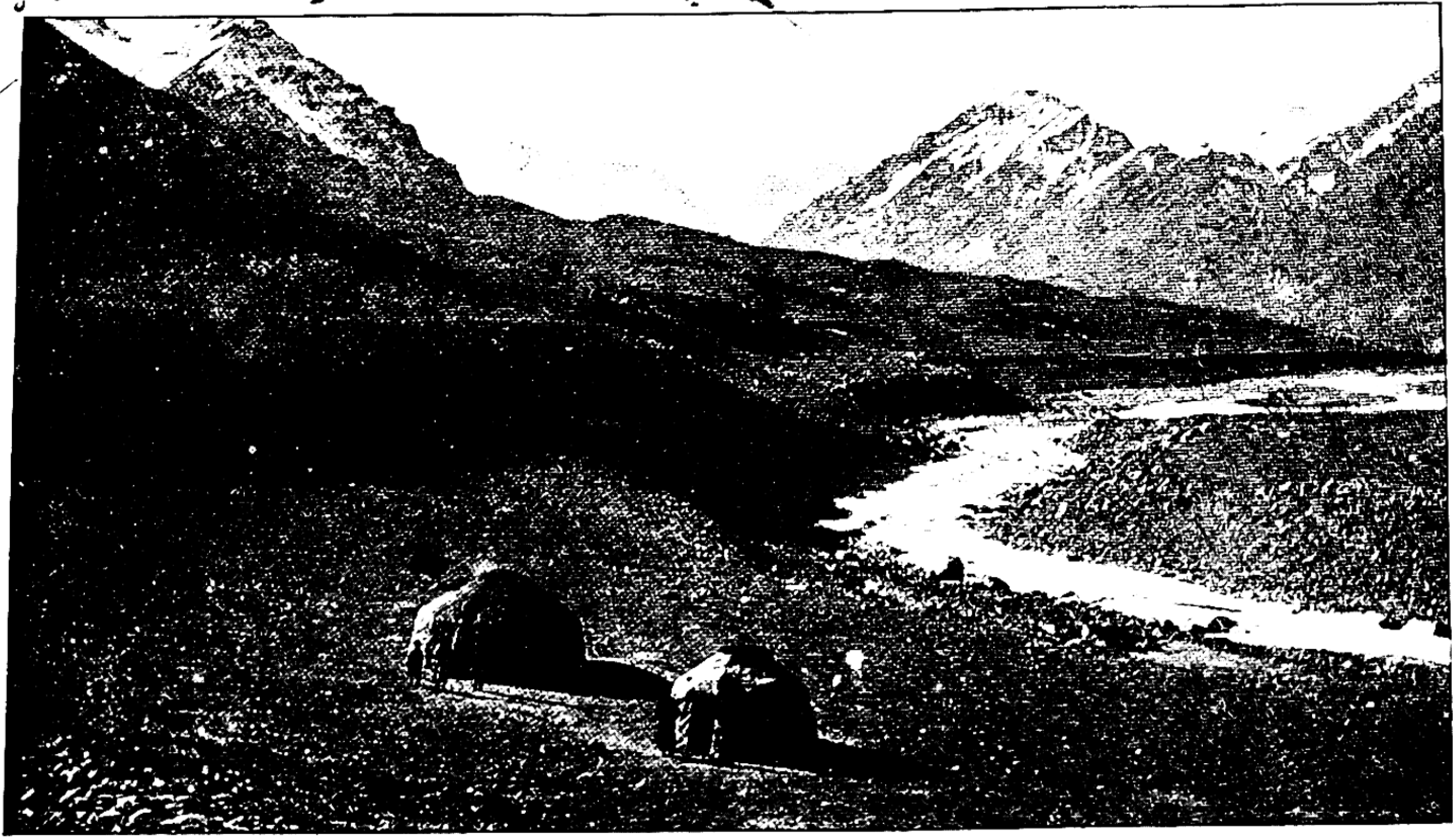

Fig. 11. A Pamir.

This picture shows a Pamir, with the stream flowing across it. In the background are the ranges which separate one Pamir from another. Notice the black Kirghiz tents pitched beside the stream.

the heat and to find fresher grass. Even on the high Pamirs there is good grazing for a few weeks in summer, and the black Kirghiz tents are often seen.

719. The soil of the steppe is extremely fertile. The decaying grasses enrich the soil, and form a fine black earth full of plant food. This is now being cultivated; and wheat and other annual cereals are replacing grass in the wetter parts.

720. Scrubs and Deserts. Steppe passes into scrub and scrub into desert in the drier parts. The scrub land, or desert margins, can be grazed for a short time after the scanty summer rains, or irrigated and cultivated where streams descend from the mountains. A line of small oases border the mountains of Central Asia, but the interior is desert. The camel is the chief animal.

721. The Monsoon Lowlands. These consist of deep alluvial soil brought down by the rivers in flood. They receive rains from the summer monsoons, and are also irrigated from the rivers. Once they were forested, but they have long been cleared and densely settled. The wild animals of the forests have been driven into its depths or killed off and domesticated animals introduced. The buffalo and humped cattle in India are used for ploughing and for draught, and the cow is regarded as sacred. The elephant takes the place of the horse. In China pigs are very numerous, for they eat coarse food, and can be cheaply fed. In Japan few animals are kept and fish is the principal animal food.

722. The Mountain Region. The mountain region of Asia is the highest and broadest in the world. Many ranges receive little rain, and all have a dry lee slope. This affects the plant belts at different heights, for plants are affected very similarly by distance from the equator and by height above the sea. The lower slopes have deciduous forest, the higher slopes coniferous forest, and the highest are covered with mountain grasses, with Alpine plants like those of the tundra, or with snow.

723. Mountain regions offer animals a shelter from man, their greatest enemy. As he pushes his settlements farther, the wild animals take shelter in the less accessible mountain regions. Among these are wild goats and sheep and some flesh-eating or carnivorous animals. The snow leopard, white to match the snow, is found at great heights. The yak, a woolly ox, is half wild and half domesticated on the high plateau of Tibet. It can cross the highest passes, and its milk supplies food, while its dung is almost the only fuel.

724. Cultivated Plants. Man has slowly changed many of these natural regions into cultivated lands. The history of civilization begins in the river valleys opening to the southern and eastern seas. Mesopotamia, and the plains of India and China, were settled and civilized before any part of Europe. Man also found a home in the steppe and domesticated its animals. We have a vivid picture of steppe life in our own Bible. The steppes are now being brought under the plough. The forests of the Mediterranean and monsoon lands have long been cleared, and the clearing of the taiga has now begun.

725. Water is the first essential of life in Asia. The earliest settled lands either received seasonal monsoon rains, or were regularly flooded by the rivers. Afterwards men learned how to irrigate, and how to store water for use in the dry season. These are still the chief problems of the European conquerors of Asia. The agricultural lands of Northern India have been enormously increased by great irrigation canals which carry the waters of the Indus and Ganges to the drier parts (§§ 840–4). Russia is doing similar work in Turan (§§ 789–93), and the Euphrates will again be used to make Mesopotamia fertile.

726. Each region has its own cultivated plants. Wheat, the most nourishing cereal, is grown in the steppes, and as a winter crop in Northern India for export. Millet is grown in the drier parts of India for home consumption. As the taiga is cleared the wheat-growing area increases. In the monsoon lands rice, which is more prolific but less nourishing than wheat, is grown in lowlands which can be flooded at certain seasons. Wherever it is cultivated we find a dense population. In the south of Indo-China and the neighbouring islands the pith of the sago palm is a staple food, and the coco-nut is also used. The date palm thrives in rainless regions, but needs water at its roots. It is grown in the irrigated oases of the hot deserts and is the staple food in Arabia. In the irrigated oases of Turan and Chinese Turkestan apricots, peaches, mulberries, and all Mediterranean fruits are grown and dried for use in winter. The vine, olive, almond, fig, and many other fruits are grown in Asia Minor and Turan. Beans and other pulses are grown both in Mediterranean and monsoon lands. Coffee is planted on the terraced mountain slopes of the south-west of Arabia, and tea is a native of Assam and the eastern forests of China. It has been planted on the slopes of the Himalayas and in Ceylon, and is in world-wide demand. The poorest China tea, including the stalks, is pressed into bricks, and carried into Central Asia on the backs of yaks.

726a. Agriculture is so important to China that the Chinese emperors turned the furrows every year, and planted the five sacred plants—rice, wheat, the large and small millet, and the soya bean.

727. Oil plants are important both in the Mediterranean and monsoon lands. Oil is used for cooking and also to protect the skin against the scorching rays of the sun. The olive, an evergreen Mediterranean tree, yields the finest oil, and is grown wherever possible. Cotton-seed oil is largely used in the oases of Turan or Russian Turkestan. Linseed is grown in the monsoon lands for its oil-bearing seeds. Another important plant is the opium poppy, which yields a stupefying juice. Tobacco is widely grown.

728. Fibre and other plants are also important. Cotton is grown on a great scale in the oases of Turan, India, China, and Japan. Jute, a coarser fibre, is grown in Bengal, and much is sent to Dundee. Manilla hemp from the Philippine Islands makes strong ropes. Silk-worms are fed on mulberry-leaves both in the Mediterranean and monsoon lands. The silks of Asia Minor, Persia, Turkestan, India, China, and Japan are famous.

729. Soils. Soil also affects plants. Asia possesses a great variety of soils, suited to different crops. Among these we may note the black earth of the steppes, enriched by much plant refuse ; the volcanic black earth of the Deccan, which suits cotton ; the loess or windborne soil of Northern China, rich in desert salts ; the red earth of the Upper Yangtse, a sandstone region ; the volcanic soils of Java and other islands, in which every tropical crop can be grown ; and the deep alluvium spread out by the rivers over the lowlands. On the other hand, much of Western Asia consists of porous limestone, and is only fertile in the valleys. The desert sands are full of plant foods and are fertile when irrigated and drained.

730. Domesticated Animals. The most important of these are the reindeer in the tundra, the horse and ox in the richer steppes, sheep and goats in the poorer steppes and in the higher plateaus and valleys, the yak in Tibet, the camel in the desert, the elephant and buffalo and humped cattle in India. The reindeer can bear extreme cold, the yak extreme height, the camel extreme drought, the elephant and buffalo intense heat. The horse and ox require richer pasture than the sheep, and the goat and camel thrive on dry pastures.

731. Fisheries. Fish is a very important food along all the coasts and in all the islands of Eastern Asia. The warm seas produce coral and pearl oysters. Divers fish for pearls in the Persian Gulf round Ceylon in the eastern seas. Sea-slug, or trepang fisheries, are important in the Far East, and the catch is sent to China as a delicacy. The Northern Pacific coasts abound with seals and whales, which are hunted.

732. Occupations. The keeping of animals and agriculture are still the two chief occupations of Asia, the former in the steppes, and the latter in the lowlands, the irrigated valleys, and the oases of the plateaus and deserts. The pastoral lands are thinly peopled, but the agricultural lowlands, especially in the monsoon area, are very thickly peopled parts. Great cities grew up in the richer river valleys, and many arts were practised in them. Among these were the spinning and weaving of cotton and silk, the decoration of leather, rich embroideries, and fine metal work. In the pastoral lands the most beautiful carpets in the world are made.

733. These ancient handicrafts are now giving place to western manufactures. Labour is abundant and cheap, and huge cotton mills in India, Japan, and China compete with those of Lancashire. China is at the beginning of a great industrial period. Not only is labour cheap and highly skilled, but coal and iron are abundant. Fig. 29 shows how widely both are found in China, though as yet they are little used.

734. Race and Religion. We can only guess the population of Asia, but it is not much under 1,000 millions, or more than half the human race. About nine-tenths of these live in the monsoon lands.

735. Asia is the home of many races and many religions. The white or Caucasian race inhabits Asia Minor, Arabia, Persia, Afghanistan, and Northern India. The brown or Malay race occupies much of Indo-China and the Malay archipelago. The yellow or Mongolian race is found from the shores of the Pacific to the frontiers of Europe. A dwarf race, of Negro origin, is found in some parts of India and some of the islands. Innumerable languages are spoken. Every degree of civilization is found, from the highly civilized peoples of Japan, China; and India, to forest tribes living in a state of nature. The European in India is a soldier, a political official, or a trader.

736. There are many religions. Mohammedanism stretches across the continent from the Mediterranean to the Pacific, and is most important in Western Asia and India. Buddhism is chiefly professed in Ceylon, Tibet, China and Japan. Hinduism is confined to India, Confucianism to China, and Shintoism to Japan. Many social observances and customs are closely bound up with each of these. All originated in Asia, as did Christianity, the religion of the white rulers.

737. Political Divisions. A few hundred years ago the steppe and desert peoples of Asia were dreaded invaders in Europe. Then the tide of conquest turned and Europeans began to invade Asia. Russia has gradually brought all the steppes under her control, and spread over the forests, deserts, and mountains which surround them. At Pamirski Post the Russian flag is planted on the Roof of the World, in a remote region where the four empires of Russia, Britain, Afghanistan, and China meet. The English, Dutch, and French found their way to Asia by sea. Britain secured the greater part of India, and the French much of Indo-China, while the Dutch possess the most fertile of the East Indies. Mediterranean Asia is divided among Turkey, Persia, and Afghanistan. In the Far East, China holds its own against European neighbours, but is torn by internal strife. It controls, actually or nominally, Chinese Turkestan, a dry region between the Tian Shan and Kwen Lun Mountains, Manchuria, and Tibet. Japan, which adopted European methods in the middle of last century, has become a strong military and naval power, and gave a severe check to the advance of Russia eastwards in the war of 1905.

Exercises

1. Divide Asia into natural vegetation belts. Which of these are absent in Europe?
2. Briefly describe the climatic conditions which produce (*a*) tundra, (*b*) taiga, (*c*) steppe. What animals suit these conditions best?
3. In which regions is the nomadic life necessary? Write a brief account of it.
4. Show as clearly as you can the relation between water-supply and density of population in Asia.
5. Name the chief cultivated plants of Asia. Which of these are not grown in Europe? Account for this.

Names of our college ~~male~~
Female students - کانجی
T.B ———
Kature ———
Malei Mas - مالثہ —
Aba yad آبیدُہ —

THE REGIONAL GEOGRAPHY OF ASIA

CHAPTER VI

SIBERIA

738. Natural Regions of Asia. Natural regions are separated by geographical and not by political boundaries. The chief causes which make a natural region are (i) latitude, (ii) distance from the sea, and (iii) height. All these affect temperature and rainfall and plant and animal life. Here only the larger natural regions of Asia are described, but each could be divided into many smaller natural regions. The most important natural regions of Asia are (i) the Siberian lands, a continuation of Eastern Europe ; (ii) the Mediterranean lands of the Near East, resembling Mediterranean Europe ; (iii) a belt of dry or desert regions, stretching north-east across Asia from Arabia almost to the Pacific ; (iv) the high mountain belt ; and (v) the monsoon lands of the south and east.

739. Siberia (5,000,000 square miles). Siberia is much larger than Europe. The coloured map explains why Russia has conquered this vast region, which forms nearly one-third of Asia. The lowlands of Siberia are continuous with those of Russia, and communication between the two is easy. The Russians advanced eastwards by following the rivers and land routes (Fig. 5).

739a. A horseman can ride from the Caspian Sea to Mongolia, grazing his horse as he goes. The Mongol invaders of Europe were horsemen, who followed the land routes. The Russian pioneers preferred the rivers (§ 661), and later the railways.

740. Physical Features. Western Siberia is a low swampy region, but Eastern Siberia is higher (§ 669). The Ural Mountains separate Siberia from European Russia, but the climate and vegetation are very similar on both sides. The Urals rise gently from the plains of Russia, and are highest in the north, where they exceed 5,000 feet. They slope more steeply to the Siberian lowlands, but the passes are numerous and easy. The Urals are rich in gold, platinum, and coal, all of which are mined. South of the Urals are the steppes and deserts of Turan (§ 789–93) round the Sea of Aral.

741. Siberia narrows eastwards between the Arctic Ocean and the Central Mountains, where the great rivers of Siberia have their sources. The highlands almost reach the Arctic Ocean in the extreme east.

742. Rivers of Siberia. Find the Siberian rivers on the map. The Tobol flows almost parallel to the Urals across the lowest part of Siberia, and is joined by many other rivers, the longest of which are the Irtish and the Ob from the Altai. These are navigable respectively to Semipalatinsk and Barnaul in the dry steppes at the northern base of the mountains. This part of Western Siberia was conquered by Russia nearly four hundred years ago. Tobolsk, at the junction of the Tobol and the Irtish, was then the capital, but Tomsk and Omsk have long outgrown it.

742a. Tobolsk is unhealthily placed among marshes, but commands many routes. The most important is by the depression of the Zungarian Gate, which rises gently between the Altai and the Tian Shan into Mongolia (Fig. 3).

743. The Yenisei, the second great river, rises in the Sayan Mountains. Some of its feeders rise in the same great marshes as those of the Ob, and the wind often decides the direction of their surplus waters. The divide between the two rivers, which is very low, is near the left bank of the Yenisei. For this reason no long tributaries come from the west, but many long rivers flow to the Yenisei from the east. The most important is the Angara, which rises in the Trans-

Baikal Highlands and flows through the long, narrow, mountain-girt Lake Baikal (§669), 400 miles long and from 10 to 60 miles wide, which is sixty-five times as large as Lake Geneva and half as large as Scotland (14,500 square miles). Lake Baikal lies over 1,500 feet above the sea, and its greatest depth is over three-quarters of a mile. The Angara leaves it by rapids to flow through a valley richly wooded with larch, spruce, and birch. Irkutsk, the chief town of the Yenisei basin, and the largest city in Siberia, is built about 40 miles below its exit, at the head of navigation. As the Yenisei flows north it often measures many miles across.

744. The Lena, the least used of Siberian rivers, rises near Lake Baikal and winds north to an immense delta on the Arctic Ocean. Like the other rivers it is often many miles wide, and is studded with islands. Yakutsk is the only important town.

745. The Amur is hardly a Siberian river. Find it on the map, and notice that it makes an important eastward route to the Pacific through a mountainous region. It flows at first parallel to the Lena through a wild country, and breaks through the Khingan ranges to the lowlands of Amuria and the Sea of Okhotsk. For some distance it forms the boundary between Siberia and Manchuria. Find its tributaries, the Sungari and the Usuri, both from the south. The Usuri is navigable, and its valley makes a natural route to Vladivostok, the Russian port on the Pacific, which is ice-free most of the year. Gold is abundant in Amuria and the neighbouring forested island of Sakhalin. The Amur has led Russia into Manchuria, where Russia and Japan jointly administer the railways.

746. The Siberian rivers, though navigable for long distances, are not very useful. They are frozen for many months, and cause long-continued floods in spring. These spread out alluvium over the lowlands, which are enriched by decaying vegetation. The Ob, Yenisei, and Lena flow north to a frozen ocean, which is useless for trade. All cross the forest region, but no timber is floated down them, as it would be if they flowed south to a busy sea. Contrast this with the importance of timber on many rivers of Europe.

747. Climate. We know already that Siberia has long cold winters and short moderately warm summers. In the extreme north the sun is hardly ever seen in winter, while in summer it seldom sets. These bitter winters long prevented settlement, and for two centuries Siberia was chiefly valued for its furs, and as a penal settlement for convicts.

748. The severity of the winter increases markedly from east to west. A few figures show that its climate is more extreme than that of Russia, which has the most extreme climate in Europe.

Place.	Latitude.	Longitude.	Height in feet.	January Temperature.	July Temperature.
Archangel .	64° 33′ N.	40° 32′ E.	49	7· 3° F.	60·4° F.
Verkoyansk	67° 33′ N.	133° 24′ E.	330	-58· 9° F.	59·7° F.
Moscow . .	55° 46′ N.	37° 40′ E.	475	12· 2° F.	66·0° F.
Nerchinsk .	51° 19′ N.	119° 37′ E.	1,837	-21· 6° F.	65·3° F.
Astrakhan .	46° 21′ N.	48° 2′ E.	49	19· 0° F.	78·1° F.
Urga . . . (Mongolia)	47° 56′ N.	106° 50′ E.	2,133	-14·80° F·	63·7° F.

749. A glance at these figures shows how much colder Siberia is than Russia in the same latitudes. The winter at Verkoyansk is over 66° colder than at Archangel, though Verkoyansk is less than 200 miles farther north. Notice that Verkoyansk is higher, which explains its cooler summer. The winter at Nerchinsk, on the Shilka tributary of the Amur, is 33° colder than the winter at

Moscow, which is farther north. The greater height of Nerchinsk partly accounts for this, but nevertheless it has almost as hot a summer as Moscow. Urga is 33° colder in winter than Astrakhan, but is a little farther north and more than 2,000 feet higher. This explains why its summer is cooler.

749a. The severe climate makes communication difficult. Most of the rivers are frozen in winter, and in summer they are vast shallow lakes. Much of the country is covered with snow in winter. Water for the train has to be brought hot, lest it should freeze on the way. Long icicles of frozen steam gather on the engine. Meat and butter can be sent for long distances in a frozen condition.

750. Siberia has a drier as well as a more extreme climate than Russia. The rainfall map in Fig. 8 shows the only part with a fair rainfall. Southern Siberia is very dry and passes into desert.

751. Natural Regions of Siberia. These depend on the climate: (i) The cold dry north, with its long winters and short summers is a tundra region, with a small population of wandering hunters and reindeer shepherds. (ii) The immense forest or taiga, intersected by streams, has also a very cold winter. The trees are evergreen, and the animals are protected by thick furs. Timber is used as fuel and for building, as there are no means of cheaply transporting it. (iii) The steppe lands are broadest in the west, and are the home of wandering Kirghiz and Kalmuk shepherds. The more fertile parts now form valuable wheat-growing lands, like those of Southern Russia (§ 587). (iv) The highlands vary with height. Above their forests are grassy valleys, to which steppe tribes drive their flocks after the grass on the lower steppes has withered.

752. Occupations. These are few and simple. Hunting, fishing, and the keeping of reindeer are the chief means of life in the tundra. Fur-trapping was once the only occupation in the forests, but clearing and settlement have now begun. The building of a railway across Siberia has encouraged settlement. Everywhere, except in the mountains, settled Russian farmers are replacing the older inhabitants, and grazing and agriculture for export are becoming important. Large towns and small villages are growing up. The Kirghiz herdsmen and their flocks are gradually being pushed into the drier steppes or into the higher mountain pastures.

753. Mining is important. The mines of the Urals have already been mentioned. Mining is also carried on round the margin of the Central Mountains, and in the Altai, Sayan, and Trans-Baikalian Highlands. Gold, silver, copper, iron, salt, platinum, and precious stones are obtained.

754. Routes and Towns. Forests and marshes make communication difficult. Western Siberia is a relatively young region and not yet well drained. All the routes go across the Kirghiz steppe, south of the marshes. The Mongol conquerors entered Europe by this route, and the railway from Europe to the Pacific also follows it. Away from the railway, winter travelling is done in sledges.

755. The Siberian Railway was the beginning of modern Siberia. It enters Asia at Chelyabinsk and is between 5,000 and 6,000 miles long. For 900 miles it passes across the level steppes of Western Siberia, which are dotted with salt lakes and marshes and almost treeless. After crossing the Tobol and Ishim the line reaches Omsk on the Irtish, often called the 'Queen of the Steppes', the centre of the black-earth region and of the wheat district. Tomsk, in a gold-mining district, a fine city, with a university and other educational institutes, is reached by a branch line.

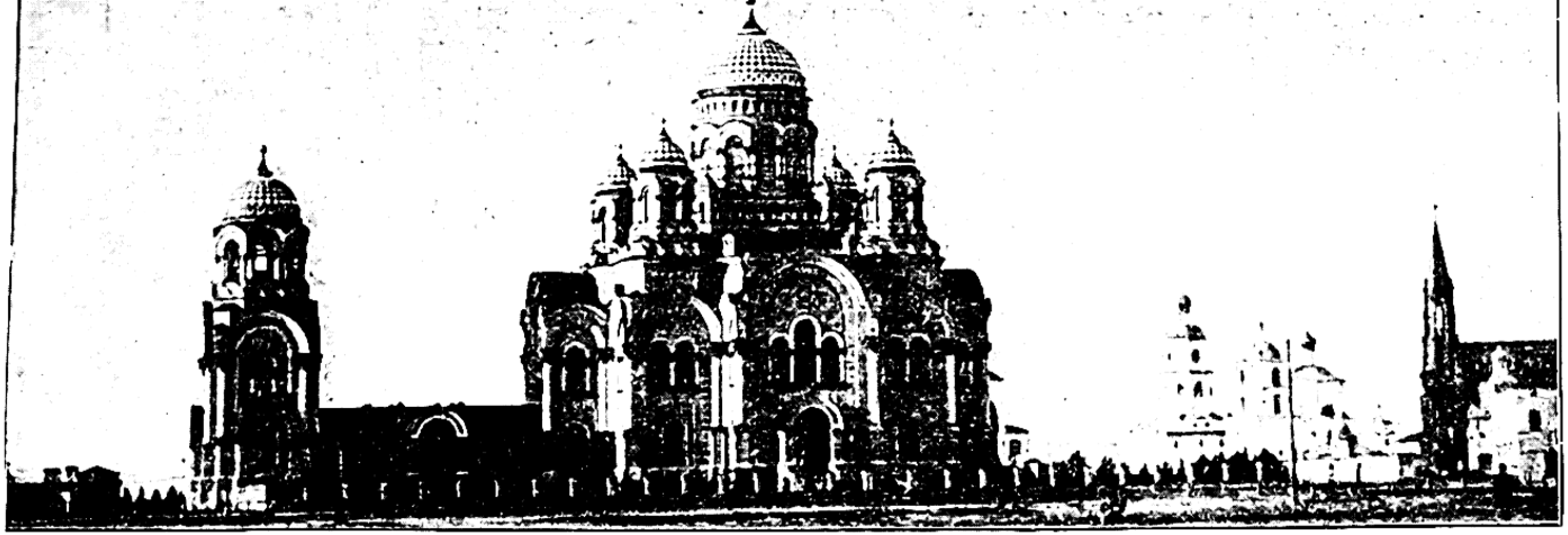

Fig. 12. Irkutsk Cathedral.

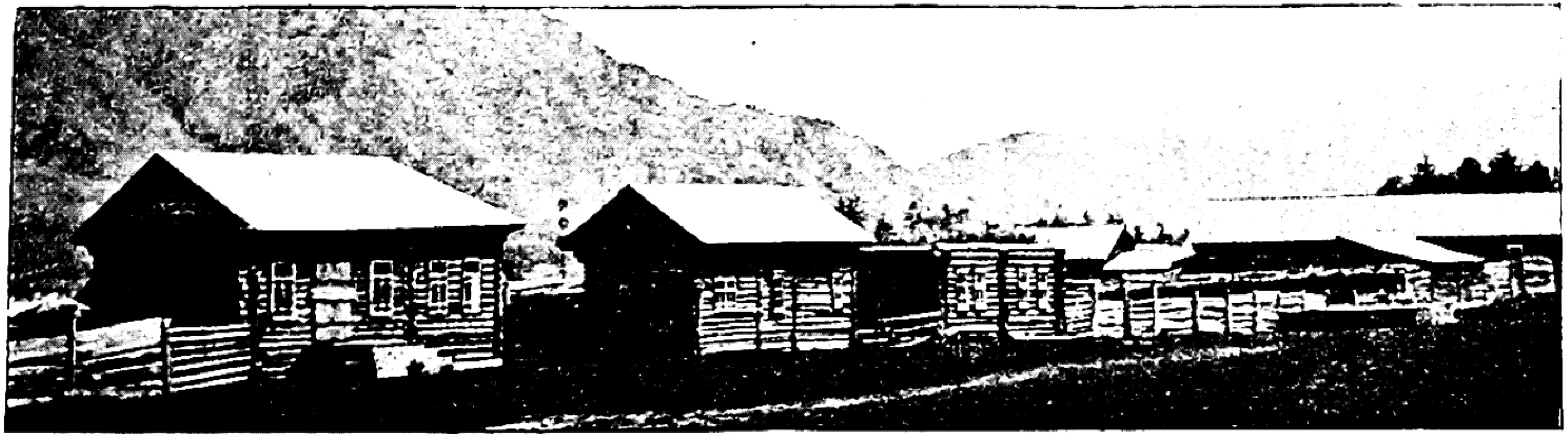

Fig. 13. A Siberian Village.

756. A bridge half a mile wide carries the line over the Ob, which at certain seasons is full of drifting ice. The distance from there to Irkutsk is over 1,150 miles. The line plunges into the dense forest, through which it runs for 300 miles to Krasnoyarsk, in a mining district on the Yenisei. Beyond Krasnoyarsk the railway again enters open country. The land rises in Eastern Siberia and the scenery is very picturesque. Irkutsk, the largest town of Siberia, is a mixture of a squalid frontier town and of a prosperous European city. Gold-smelting is important in the neighbourhood. The line skirts the picturesque southern shores of Lake Baikal, and divides into two branches, both of which cross the Trans-Baikalian highlands towards the Pacific. The northern branch goes to Stretensk, for the navigation of the Amur, on which Blagovestchyensk and Khabarovsk are the chief river ports. The main line crosses Manchuria to Vladivostok, on a fine harbour on the Pacific. A southern branch passes by Mukden to the Pacific, which Russia lost after the war with Japan in 1905.

Exercises

1. Give figures to illustrate the climate of Siberia, and explain their meaning. (See also § 683.)
2. What are the advantages and disadvantages of the Siberian rivers as routes? How does this affect the country?
3. What are the chief natural resources of Siberia? How are they used at the present time?
4. Mark on a map the January isotherm of 32°, the Trans-Siberian Railway, Omsk, Irkutsk, and Vladivostok. Insert also the Ob, Yenisei, Lena, and Lake Baikal.

CHAPTER VII

THE NEAR EAST

757. Caucasia. Caucasia includes the province of Cis-Caucasia in Europe (85,000 square miles), and Trans-Caucasia (95,000 square miles) in Asia. The coloured map shows that the Caucasus runs south-east, from the shores of the Black Sea to those of the Caspian. The valleys of the Kur (830 miles), which is shown but not named in the map, and of the Rion, which flows to the Black Sea but is not shown, separate the Caucasus from the Armenian Highlands.

758. The Caucasus consists of high parallel ranges separated by deep gorges and valleys. Their total length is about 750 miles, and the breadth from 120 to 150 miles. Less snow falls than in the Alps, for the Caucasus are farther south and in a drier region. Glaciers fill the higher valleys, but do not descend so low as in the Alps. Elbruz (18,500 feet), an extinct volcano with two old craters, is the highest point, and several other summits are nearly as high.

759. The passes are all high and difficult. The easiest route between north and south is by the defile known as the Dariel or Cross Mountain Pass, which leads to a col 8,000 feet high. This route is so important that a military road has been built across it from Vladikavkaz, in Russia, to Tiflis, the capital of Trans-Caucasia, in the Upper Kur valley. The railway takes an easier but much longer route across the eastern spurs of the Caucasus, follows the shores of the Caspian, and strikes inland across the lowlands to the Kur valley.

760. Rivers of the Caucasus. The rivers descend in steep valleys to small lowlands. In their upper

- New Boundaries - And New Countries.

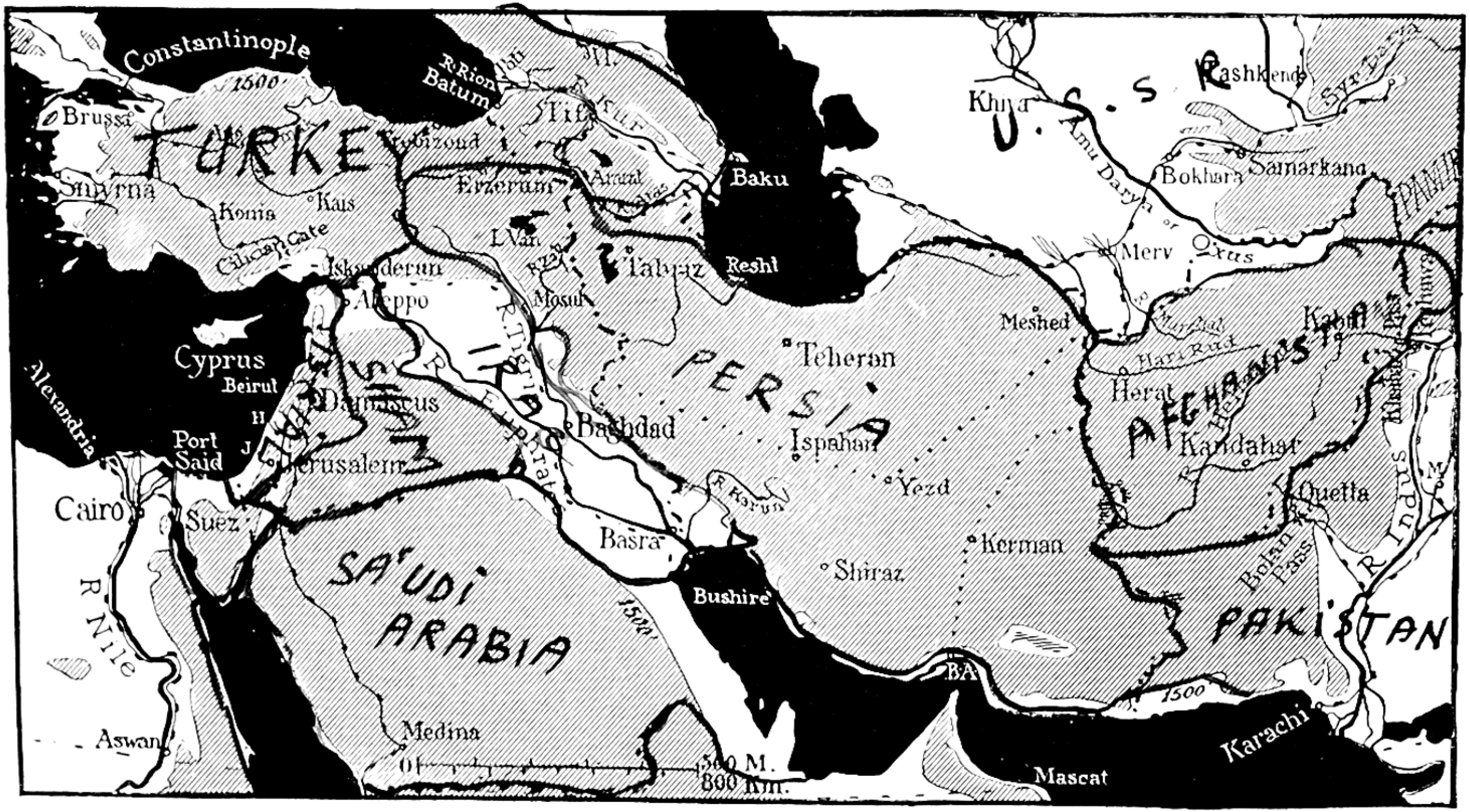

Fig. 14. The Near East.

Land over 1,500 feet is shaded, and seas and lakes are blackened.

courses they flow through wild defiles of dark slate or limestone. They are swollen in spring by melting snows and in autumn by rains. In summer they carry little water, which is used to irrigate the broader lower valleys. The beech forests of the higher valleys have a gorgeous undergrowth of azaleas, rhododendrons, and other flowering shrubs. The valleys are warm and fertile, especially on the southern slopes, where they are protected from the cold north winds of the Russian steppes. The west has a heavier rainfall and a richer vegetation than the east. The lower slopes and valleys are cleared and planted with maize, cotton, tobacco, and vineyards.

761. The northern slopes are drained to the Caspian by the Terek. The southern slopes, which fall very steeply, are drained to the Black Sea by the Rion, and to the Caspian by the Kur, which receives the Aras, or Araxes (640 miles), from the Armenian Highlands. The line of the Kur-Rion valleys makes a difficult but important route from sea to sea. Tiflis, the capital of the old kingdom of Georgia and the Russian province, is built in the Upper Kur valley among wild surroundings. Below Tiflis the Kur leaves the mountains, and crosses forests, pastures, and swamps to its delta in the Caspian.

762. The Armenian Highlands. These form a wild, rugged, inaccessible region where several different lines of height (§ 651) are squeezed, as it were, together. The volcanic peaks of Ararat (17,000 feet) and Little Ararat (13,000 feet) rise on the frontiers of Russia, Persia, and Turkey. Difficult routes meet at Erivan, at the base. The Euphrates and Tigris rise in the snows of the Armenian Highlands, and flow to the Persian Gulf.

763. Occupations. Armenia consists of high barren mountain ranges interspersed with rolling steppes and fertile vales. In the latter, maize, the vine, cotton, and tobacco, are grown by settled Armenian peasants. Roads hardly exist, and communication and good government are difficult. The highlands are the home of fierce Kurdish shepherds, who feed their goats and sheep on the pastures and often raid the cultivated valleys.

763a. Such feuds are common between highlanders and lowlanders. The old raids and wars along the Welsh and Scottish borders are examples in our own history.

764. The richest valleys are in Trans-Caucasia, where a strong government keeps order. Trans-Caucasia is important to Russia because it controls the routes between Central Asia and the Mediterranean. Petroleum is found round Baku on the Caspian Sea, and is used all over the world for lighting houses and driving machinery, engines, motor cars, &c.

765. Towns of Trans-Caucasia. Tiflis, the capital, is built on both sides of the Kur, in a narrow valley shut in by limestone heights nearly 2,000 feet high. A new Russian city has grown up beside the picturesque old Georgian town. People of many races are met in its streets and seventy different dialects are said to be spoken. Tiflis is connected with the Black Sea ports by a line which crosses the divide to the picturesque and fertile Rion valley, which it follows to Poti, the northern port. From Poti it skirts the coast to Batum, the oil port, where Baku oil is pumped into tank steamers and shipped to Europe. The line from Tiflis to Baku follows the Kur valley till the river leaves the mountains and then skirts the southern base of the Caucasus. Baku, the centre and port of the oil district, is a squalid place of chimneys, pumping stations, and refineries, with an all-pervading smell of petroleum. Its busiest quarter is called Black Town. The railway runs north from Baku to Vladikavkaz and Derbend, where it connects with the Russian railways.

765a. The winters on the highlands are bitterly cold. The common winter dress is a thick sheepskin coat with the wool on. This is almost universally worn in winter in Asia, except in the south and east. (Cf. § 1342).

766. The Turkish Provinces. Russia holds the land routes across the broad Isthmus of Caucasia. Turkey holds the seaward end of the routes across the most fertile provinces of Mediterranean Asia. Asia Minor, or Anatolia, Syria, and Mesopotamia all belong to Turkey. Asia Minor has a long coast on the Black Sea, the Sea of Marmora, the narrow straits between Europe and Asia, and the Aegean Sea. Syria and Persia open to the Levant or Eastern Mediterranean.

766a. Two thousand years ago the cities of Asia Minor were famed for their wealth and their enormous trade by land and sea. Still earlier, Tyre and Sidon, on the coast of Syria, traded with all parts of the known world, and even visited the tin mines of Cornwall.

767. Asia Minor (193,000 square miles). The coloured map shows that all Asiatic Turkey is high except Mesopotamia. The Pontic Mountains fall steeply on the north to the Black Sea, which has no good harbours. Trebizond is the chief port. On the south the Taurus (7,000–10,000 feet) rise high above the sea, but recede inland where the Syrian coast turns south, enclosing the fertile plain of Cilicia where cotton is grown. Routes lead from Cilicia (i) over the Taurus by the pass of the Cilician Gate to the plateau, and (ii) to Aleppo (§ 779), on the shortest route from the Mediterranean to the Euphrates.

768. The high plateau of Anatolia is shut in between these bordering ranges, which converge eastwards to the Armenian Highlands (§ 762). The Anatolian plateau reaches 6,000 feet in the east, but in the west it rarely exceeds 2,500 feet, though Olympus, near the sea of Marmora, is over 7,500 feet. The plateau is broken by heights, of which the Anti-Taurus is the most important, dividing the province into Eastern and Western Anatolia.

Broad vales open westwards to the Mediterranean and form routes inland. The west coast is deeply cut by the sea, which forms long gulfs and good harbours.

769. The rivers rise in the higher east and flow west. Some break north and south through the mountains to the Black and Aegean Seas. The longest of these is the Kizil Irmak, which rises in Armenia, crosses Eastern Anatolia, turns north, and breaks across the Pontic ranges to the Black Sea. The Gediz and Menderes flow west, and their valleys form important routes. Their upper courses on the plateau are in deep steep-sided valleys. Many shorter rivers do not reach the sea. All the rivers carry most water in winter, the rainy season, or in spring when the snows melt, and are lowest in summer.

770. Climate. The coast of Asia Minor has hot summers and warm winters, but the winters are cold on the plateau and the higher ranges. The rains fall in winter. The high edge of the plateau has an ample rainfall, but most of the interior is dry. The snowfall on the Armenian and other high ranges is very heavy.

770a. Remember that a heavy snowfall corresponds to a much smaller rainfall. A foot of snow, melted, is equal to an inch of rain.

770b. The heavy winter rains of Western Anatolia fall on soil parched by the hot summer sun. The swollen rivers carry this down with them and deposit it as silt along the coast. Ephesus and other ports have thus been silted up.

770c. Deep valleys, with almost perpendicular sides, are found in rainless countries where there is little rain to give the valley sides a slope. Such valleys are often called canyons.

771. The northern slopes of the Pontic mountains are forested with beech, oak, and firs, and an undergrowth of azalea and rhododendron (§ 760). The forests of the Taurus are not so dense. The western slopes facing the Mediterranean have been largely cleared, but the valleys are still well wooded. The interior is treeless, or dotted with tall dark cypresses and with stone (or umbrella) pines. Much of the plateau consists of poor steppe and salt-marshes, lakes, and plains. The better parts form broad fertile plains, irrigated by streams from the surrounding heights. Wheat is grown round Sivas in the lower valley of the Kizal Irmak. The vine, olive, fig, orange, maize, opium, cotton, tobacco, carob and other beans, lentils, the mulberry for silk-worms, and liquorice come to perfection. Vast dry areas graze sheep, goats, and camels. Angora, in the middle of the plateau, produces a breed of goats which supply fine hair for making mohair cloth.

772. Occupations, Routes, and Towns. The chief occupations are agriculture, the keeping of animals, and the manufacture of silk, cotton, and wool, the latter into fine Turkey rugs and carpets. Trade is important along the coast, where many men become sailors or sponge-fishers.

773. Communication is difficult, because of the height of the plateau and the barrenness of the interior. A railway has been built from Skutari, an Asiatic suburb of Constantinople, to the northern base of the Taurus, and will be continued to the Persian Gulf across Mesopotamia. The chief port is Smyrna, at the head of a long gulf, with a good harbour. It exports figs, silk, &c. A line climbs from Smyrna to the plateau, by the Gediz and Menderes valleys, to connect with the Skutari line. All the roads are poor, but much traffic is carried by caravans of camels and mules. Brussa, at the foot of Mount Olympus, has a silk industry. The other plateau towns, besides Angora and Sivas, are Konia or Iconium, once the capital, and Kaisareyeh or Caesarea. Kaisareyeh is built where the route from the Euphrates joins the routes by the Cilician Gate from Cilicia, Syria, and the Mediterranean.

774. Turkish Armenia and Kurdistan (72,000 square miles) is rugged, with some fertile valleys. Lake Van, a salt lake (1,400 square miles), lies over 5,000 feet above the sea. The Armenian Highlands sink by rugged terraces, cut by gorges, which carry the feeders of the Tigris and Euphrates to the Mesopotamian plains. The largest town, Erzerum, forwards the produce of Armenia to Trebizond, the port.

775. Syria. Syria is a tableland crossed by a deep rift valley, to which its edges fall steeply. West of the rift it forms the Lebanon ranges (10,000 feet), which fall abruptly to the Mediterranean. Farther south are the hill lands of Galilee, Samaria, and Judaea. Between these and the sea are the plains of Sharon and Philistia, bordered by a low, sandy, harbourless coast.

776. East of the rift the tableland forms the ranges of Anti-Lebanon which culminate in Mount Hermon. In the south it sinks to the hills beyond Jordan (Bashan, Gilead, Moab, Edom). The tableland slopes gently eastwards, forming the Syrian desert, a barrier several hundred miles wide between the Mediterranean and the Euphrates.

777. Between Lebanon and Anti-Lebanon the rift is drained by the Orontes and the Leontes, the former flowing north and the latter south, and both breaking west through the mountains to the Mediterranean. The southern part of the rift is the valley of the Jordan (200 miles), which rises in Mount Hermon, and flows south through two lakes to the deep depression of the Dead Sea, which lies 1,300 feet below the Mediterranean. East of Jordan, 'beyond Jordan', is the volcanic region of Hauran (Bashan), where fine wheat is grown.

777a. South of the Dead Sea the dry rift is called the Akabah. It is continued by the Gulf of Arabah, east of the Sinai Peninsula, the Red Sea, and the rift valleys of Africa.

777b. Volcanoes are often found near rift valleys and were probably formed at the same time.

778. The Bible describes Palestine as a fertile land, flowing with milk and honey and producing all Mediterranean plants. The stones gathered off the hill slopes were built into terrace walls to hold up the soil and the moisture. These terraces were planted with oliveyards and vineyards, as in Italy. Wheat was grown in the plains of Sharon and Philistia. The land beyond Jordan, now a desert, where Arabs pitch their skin tents beside their camels and goats, was fertile and well-peopled in Roman times, and ruins of fine cities and aqueducts still remain. War and bad government have ruined terrace culture and irrigation, and left the land infertile and thinly peopled.

778a. Milk and honey are steppe products, milk from the flocks and herds, and honey from the bees which cover the steppe flowers. This seemed sufficient wealth to a people wandering in the wilderness, but the Promised Land proved richer than any steppe.

779. Towns and Routes. The old capital of Syria was Antioch, on the Orontes, with Iskanderun or Alexandretta as its port. Aleppo, midway between the Mediterranean and the desert, is a great centre of routes and trade. Damascus, the capital of Syria, one of the oldest cities in the world, lies at the base of Anti-Lebanon, on the margin of the Syrian desert, and owes its fertility to the rivers Abana and Pharpar. It is the starting-point of three ancient caravan routes: (i) west, across Anti-Lebanon and Lebanon to Beirut, and thence to the Mediterranean and Egypt; (ii) east, to Baghdad on the Tigris, in Mesopotamia, and thence to the Persian Gulf and India; (iii) south, across the desert to Mecca, in Arabia. Jerusalem, once the capital of Judaea, stands on a spur of the tableland, isolated by deep ravines. It is a typical eastern city, with narrow streets, low, windowless, flat-roofed houses, and walled gardens, crowned by the dome of the Mosque of

Omar. The surrounding country still has many olive- and vineyards. The port is Jaffa, connected with Jerusalem by rail. Jericho, in the low hot Jordan valley, stands among groves of palms and bananas.

779a. Iskander is a corruption of Alexander, a Greek king who pushed far into Asia. Many places are named after him, among others Kandahar (§ 99).

779b. Every Oriental town has its bazars, which are the resort of all who have business to do or news to tell. They consist of rows of windowless shops, all those of one kind being together. An awning is often stretched overhead to keep off the sun.

780. The roads of Syria are very poor. Beyond Jordan travellers are often attacked by Arab robbers, and as a protection they travel in large parties or caravans. Railways now connect the chief centres. Aleppo is connected with the coast, and Damascus with Beirut, Haifa, and Medina.

781. Mesopotamia. Mesopotamia, 'the land between the rivers', includes part of the highlands, but is generally used only of the Euphrates-Tigris plains. Properly it refers only to the lands between these rivers. Highlands and deserts shut it off from every sea but the Persian Gulf. The Euphrates and the Tigris rise in the Armenian Highlands, and their upper courses are very wild. The Tigris gathers up the waters of the Zab and other tributaries, and joins the Euphrates near the Persian Gulf. Both rivers bring down much silt, out of which the Mesopotamian plains have been built up. The delta is growing southwards into the Persian Gulf at the rate of 72 feet a year. The rivers often flood the plains, leaving behind a layer of fertile alluvium. Mesopotamia was once the garden of the world, but irrigation is now neglected. Below Baghdad, the whole plain, once the rich Empire of Babylonia, is an expanse of dry mud and unhealthy swamps dotted with miserable villages.

782. The Mediterranean winds do not reach Mesopotamia, which has warm winters and extremely hot summers. Camels, sheep, and goats are kept, and some wheat is grown. Dates are grown below Baghdad, and shipped from Basra.

783. The largest towns are Mosul, near the old site of Nineveh, and Baghdad, famous in the *Arabian Nights*, both on the Tigris. Nineveh owed much of its importance to its position, where routes from the Persian Gulf, the Black, the Caspian, and the Mediterranean Seas meet. The modern city, at the head of the navigable Tigris, is on a height above the flood-level. Baghdad lies on both banks of the Tigris about 500 miles above the Persian Gulf, and 300 miles above Basra. A bridge of boats connects the two banks.

783a. The boats of the Tigris are very interesting. On the Upper Tigris rafts are fastened to sheepskins which are inflated with air. Such rafts are used on many rivers of Central Asia (§ 816). Other boats are made of basket-work and pitch, and must be like the ark of bulrushes in which Moses was set adrift on the Nile. At Baghdad curious round boats made by covering wicker with hides are used. Finally, there are modern steamboats, which come as far up the rivers as the season will permit.

Exercises

1. Write a short account of Trans-Caucasia and its importance to Russia.
2. Why are there few railways in Asia Minor, and why is the country thinly peopled?
3. Mark on a map Aleppo, Baghdad, Baku, Damascus, Tiflis, Trebizond. Give the geographical causes which have made each important.

پاکستان زندہ باد ـ شیخ عبداللہ مردہ باد

بخشی ڈوگرہ مردہ باد بقلم خود

CHAPTER VIII

THE DESERT BELT

784. A belt of dry deserts stretches north-east across Asia from the Red Sea to the Khingan Mountains. This includes the tableland of Arabia, the high plateau of Iran, the low deserts of Russian Turkestan and the Lower Indus, and the higher Chinese desert.

785. Arabia lies in the track of the trade winds (§ 177) which are dry. Iran is a continuation of this desert, made fertile in parts by streams. The Indus desert is also in the trade-wind belt. Russian and Chinese Turkestan and Mongolia are shut in by high mountains which keep out wet winds.

785a. The surface soil and rocks of desert lands weather very quickly, for no screen of cloud or covering of plants protects them from extremes of heat or cold. The surface is intensely heated when the sun is shining and chilled at other times. The alternate expansion and contraction splits off fragments which are worn down into smaller pieces and piled up by winds into stony or sandy deserts. The finest sand is carried farthest and forms crescent-shaped dunes which face the direction of the wind. These dunes are often as high as hills, and as they move onwards they overwhelm cultivated tracts, by blocking the wells and filling the canals. Many buried cities have been discovered in Russian and Chinese Turkestan. The dry air preserves their contents from decay. Exquisite pictures and embroideries, as well as animal remains, which have been buried for centuries, are found uninjured.

786. The following figures show the climate of the desert lands:

Place.	Latitude.	Longitude.	Height in feet.	January Temperature.	July Temperature.
Muscat . .	29° 0′ N.	58° 35′ E.	20	69·3° F.	89·9° F.
Karachi . .	24° 51′ N.	67° 4′ E.	50	63·3° F.	85·7° F.
Teheran . .	35° 4′ N.	51° 39′ E.	3,900	32·4° F.	84·9° F.
Kabul . .	34° 30′ N.	69° 18′ E.	6,235	31 6° F.	76·6° F.
Samarkand .	39° 39′ N.	66° 57′ E.	2,360	32·2° F.	77·9° F.
Tashkend .	41° 20′ N.	69° 18′ E.	1,610	30·0° F.	90·8° F.
Kashgar . .	39° 25′ N.	76° 7′ E.	4,035	21·6° F.	81·5° F.
Yarkand .	38° 15′ N.	77° 16′ E.	4,265	31·8° F.	81·7° F.
Urga . . .	47° 56′ N.	106° 50′ E.	2,133	−14·80° F.	63·70° F.

787. Muscat is in the extreme south of Arabia and has scanty summer monsoon rains. Karachi is in the Lower Indus desert. Teheran and Kabul stand high on the dry Iran plateau. Samarkand, Tashkend, Kashgar, and Yarkand are in Turkestan. Urga is in Mongolia. Teheran has only about twenty-five wet days a year, and Isfahan or Ispahan (§ 802) only twelve. Both places have a rainfall under 10 inches. Samarkand has about 13 inches of rain a year and Kashgar about 16.

788. Plants and Rain. Plants are natural rain-gauges, and illustrate climate better than any figures. They affect man, and often cause great movements of people. The famine in Palestine sent the children of Israel into Egypt. Russia, with millions to feed, has had to push across Asia; Japan to colonize the Pacific shores; and Britain to annex many colonies and irrigate the drier parts of them.

789. Turan or Russian Turkestan. Turan is a depression lying almost in the middle of the desert belt. It is fertile where it is irrigated and barren elsewhere. High mountains shut it in except on the north. These keep off moist winds from the interior, but receive enough rain and snow to feed long rivers. The Syr and Amu reach the Aral Sea, but many rivers are lost in the desert sands. Only about one-tenth is fit for settlement, and much of this is poor scrub which pastures animals for a few weeks only. The wandering life of the tent-dwellers has already been described (§§ 715–17). Carpets, rugs, and felt are made from the wool, hair, and skins of animals; for these are warm, easily carried, and readily exchanged.

790. The rivers of Turan come down in steep valleys from the high glaciers of the Hindu Kush, Pamirs, and Tian Shan. They carry comparatively little water, except in early summer after the melting of the snows. They flow swiftly and bring down much rock waste, which they spread out over the more level valleys, or build up into alluvial fans where their current slackens on entering the lowlands. Such alluvial soil is fertile wherever it can be irrigated. The fertile upper valley of the Syr Darya forms Ferghana, where cotton is grown to supply the mills of Moscow. Wheat, maize, flax, tobacco, the vine, and the mulberry for silk are cultivated. Tashkend, the terminus of the Trans-Caspian line, is near the end of this valley. In the Russian quarter broad streets are lined with poplars and imposing houses, but the old town keeps its bazars and its narrow squalid picturesque streets. Kokand, also irrigated from the Syr, is in a drier pastoral region.

791. Samarkand and Bokhara, two of the oldest cities of Central Asia, are irrigated by the Zerafshan. Samarkand was conquered by Alexander the Great, and both have been destroyed and rebuilt many times. These cities are separated from the Caspian Sea by the broad Kara Kum or Black Sand Desert, across which the Oxus winds to the Aral Sea, irrigating Khiva on its way. The Aral Sea is the submerged lowest part of Turan, and its waters have no outlet and are brackish. Farther south is the oasis of Merv, irrigated by the Murghab from Afghanistan. In the east the Ili flows through infertile country to Lake Balkash.

792. Life in the Oasis Towns. Water brings many crops to perfection, gives rise to settlement and trade, and leads to the growth of wealth. The oasis towns are surrounded by high walls, pierced with gates, which are closed at night for safety. The narrow streets keep out the burning summer sun. The houses and mosques are built of bricks of sun-dried mud, and are often beautifully ornamented and roofed with coloured tiles. Caravans of camels are constantly arriving with produce from distant oases, and the bazars are always crowded. Beautiful embroideries, metal work, tiles, &c., are on sale, and the steppe-dwellers bring in carpets, skins, and honey for making sweetmeats. Samarkand and Bokhara are centres of Mohammedan learning, with famous colleges and mosques. Samarkand is higher up the valley than Bokhara, and obtains its water first. As it grows Bokhara will decrease in prosperity. Both towns are intersected by a network of irrigation canals, and only a limited amount of water is allowed to pass through each.

792a. There are many differences between settled and unsettled people. The nomads live in tents, are ever on the move, and have no wealth but their animals and their produce. They are half shepherds and half robbers. The settled people build fine cities, and practise many arts. Even the food is different. The nomads live chiefly on milk, the oasis people on grain and on fresh or dried fruit. Only the rich among either can afford to eat much meat. Their virtues also differ. Honesty and truth are less important than courtesy among strangers who seldom meet. This explains the good breeding and bad faith of the East. Hospitality is the highest of virtues among desert peoples, because places of shelter are far apart. The steppe-dwellers covet the booty of the towns, and the townsmen fear their fierce neighbours. They do not easily combine for a common end, and this partly explains why Russia has conquered much of desert Asia so easily.

792b. All dry countries suffer from locusts, which devour every green plant in their way. Turan is no exception.

793. The Trans-Caspian Railway. Vast steppes and deserts lie round the Caspian and Aral Seas. In earlier days caravan travel was slow and dangerous, but the Russian conquerors have built a railway to carry troops, food, water, and merchandise quickly. This line leaves the barren shores of the Caspian Sea, where all water must be distilled, and winds across the interminable desert. The sands would soon drift over it, but hedges of saxaul, a desert plant, keep the line clear. The railway goes by Merv, an important route centre

(§ 791), crosses the Oxus by a great bridge, and runs by Bokhara to Samarkand in the Upper Zerafshan valley and Tashkend in the Syr valley. At Tashkend it connects with the Siberian and Russian lines.

794. Chinese Turkestan lies high above Turan. It is shut in between the Tian Shan Mountains on the north and the Kwen Lun on the south, and rises in the east to Mongolia. The easiest ways into it are by the Zungarian Gate (§ 742a) or by the Irtish valley from Semipalatinsk (§ 742), but the routes over the mountains are long and difficult. The Tian Shan (24,000 feet) and the Kwen Lun (22,000 feet), keep out all rain from the interior, but enough falls on their peaks to feed some streams. The longest of these is the Tarim, which is fringed with poplars and willows, and loses itself at last in the reedy swamps of Lob Nor. Most of Chinese Turkestan is sandy waterless desert. The trade routes pass north and south of this desert by a line of oases irrigated by mountain streams. The northern route follows the southern base of the Tian Shan, and the southern one goes by the northern base of the Kwen Lun. Kashgar, the largest town, is the starting-point for both.

795. Kashgar and Yarkand are irrigated by streams which flow to the Tarim. Both are walled cities, intersected with irrigation canals, and consist of low flat-roofed houses set in orchards and gardens.

795a. Strange faces are seen in the streets of both cities. Pigtailed Chinamen have travelled 3,000 miles westwards across deserts and high passes, swarthy Indians have come as far from the south, and Afghan camel drivers have come by steep valleys and across broad deserts.

796. Mongolia. Mongolia (1,300,000 square miles) is farther east and much higher. It is shut in by the Eastern Highlands on the east (§ 654), and by the Kwen Lun on the south. About one-fourth consists of the desert of Gobi or Shamo, and the rest is a poor scrub which is green for a few weeks in spring. Horses are kept on the better pastures and camels and sheep on the poorer. Routes go eastward by lines of oases at the base of the mountains, as in Chinese Turkestan. None of the oasis towns are very large, but Urga is famous as the holy city of the northern Buddhists. Russia has recently annexed Mongolia.

796a. The rich plains of China have always tempted the Mongol horsemen, and the Great Wall of China was built along the mountains to keep them out. The Mongols also pushed westwards across the steppes and deserts into Siberia, Russia, and Hungary.

797. Iran. Iran is divided between Persia and Afghanistan. Baluchistan is now practically British. Russia has great political influence in Northern Persia, which is nearest Russian territory, and Britain in Southern Persia, which is nearer India.

798. A large map shows that the Hindu Kush and many other ranges meet in Afghanistan. The frontier with Britain and Russia and China is on the Pamirs. The glaciers of these lofty ranges feed many streams, but only the tributaries of the Indus reach the ocean. All carry most water in their upper courses, and this explains the great height of many towns. Kabul, the capital of Afghanistan, is nearly 7,000 feet high, but the hot summer enables plants to ripen at this height.

799. Afghanistan (250,000 square miles), with its high mountains and dry extreme climate, is a poor country with a few fertile valleys. The rivers carry most water in early summer when the snows melt and bring down fertile alluvial soil. Many of the river valleys are important routes, and are the only settled parts. Kabul, the capital, lies in the broad valley of the Kabul river, which flows to the Indus. It is surrounded by orchards and irrigated fields, and the buildings are of sun-dried mud. The valley forms part of the route to India, but lower down it becomes impassable, and the narrow defile of the Khaibar Pass is used instead. This is about 33 miles long, and in some places only a few score feet wide. A handful of marksmen posted on the heights which shut it in could hold an army in check. The Khaibar leads to the plains of Peshawar in Northern India (§ 841). The Heri Rud rises near the Kabul in the Hindu Kush, but flows in the opposite direction. After irrigating the oasis of Herat it loses itself in the desert of Turan. Kandahar, founded by Alexander the

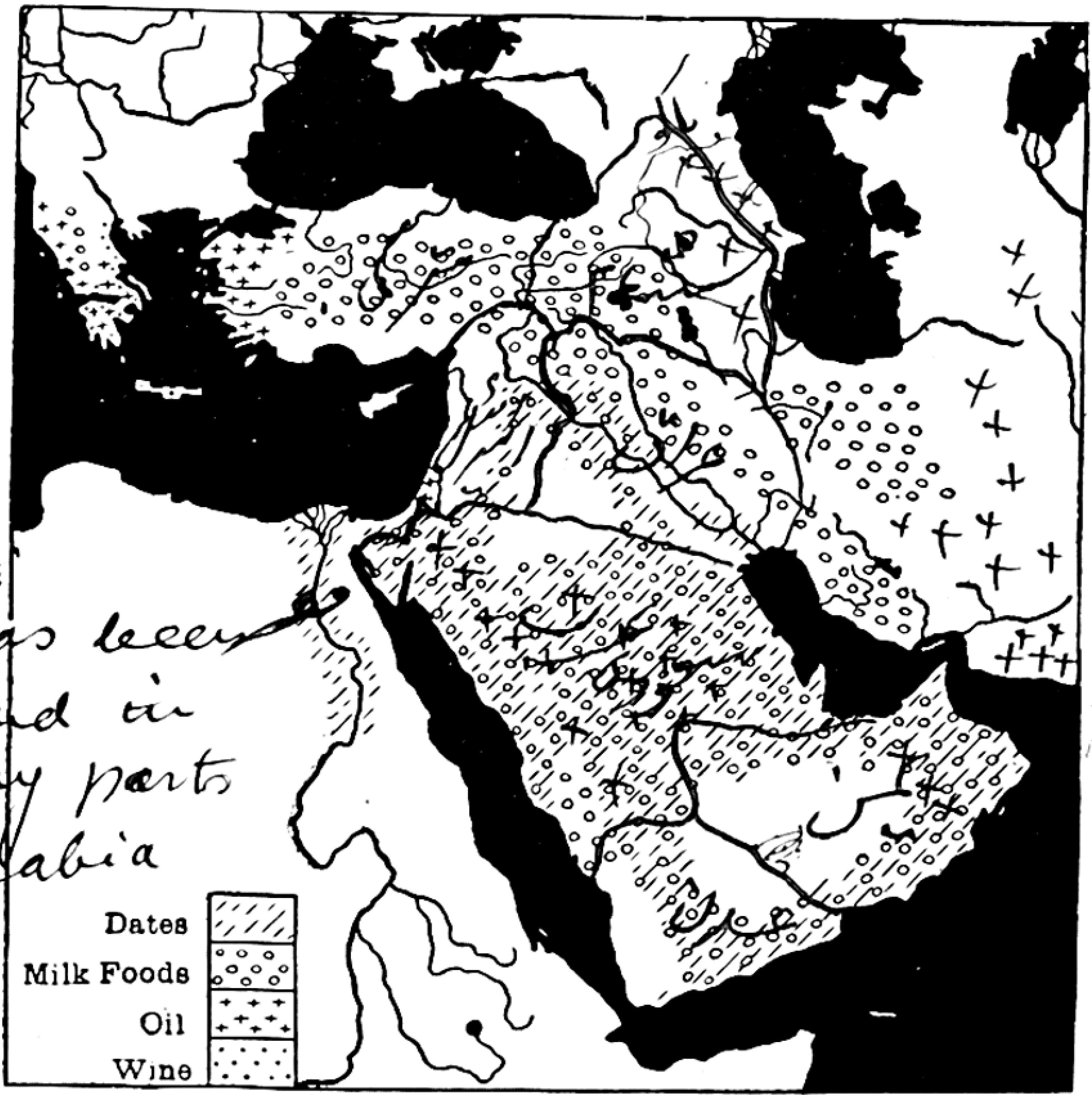

Fig. 15. Some Food Products of S.W. Asia.

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Great, in the Helmund valley, commands a route to India by Quetta, the capital of Baluchistan, and the Bolan Pass. The Helmund disappears in the marshes of Seistan.

800. Baluchistan, to the south, is a stony desert, frozen in winter and parched in summer, and producing little but a few oases of palm trees. It is valuable because it guards an overland route to India.

801. Persia. Persia (625,000 square miles) is lower, and some of its valleys are richer. Many of its mountains are of limestone, through which water sinks, so that there are few rivers, but much underground water. A belt of desert, several hundred miles wide, separates the valleys of Western Persia from the steppes of Khorasan in the east, where the keeping of animals and the making of carpets are the chief occupations. The routes from Turan to Persia are all difficult. Tabriz is the chief centre in the west, near the Armenian frontier, and Meshed in Khorasan corresponds to it in the east. The Elburz Mountains (19,000 feet) keep off all moisture from the interior. They fall steeply to the Caspian Sea, and the seaward slopes are forested. High valleys open south between their parallel ranges, and these are irrigated. Trees which like dry air and water at their roots come to perfection, and the Persian apricot and mulberry are the finest in the world. The silk industry is very important, and Resht, on the Caspian, is its port.

802. Teheran, the capital, lies at the southern base of the Elburz Mountains, in sight of the snowy volcanic cone of Demavend. Bad roads lead from it to all the other important centres. East of the limestone heights of Kurdistan is a high broad valley which is fertile where it can be irrigated. The largest town is Isfahan, where many ancient arts are carried on. Jewellery is one of these, for the turquoises of Persia are famous for their beauty. Beyond this valley are more limestone mountains, and more valleys beyond. Yezd and Kerman, the latter noted for carpets, are the largest towns in the eastern valleys. Still farther east is the great desert (§ 801).

803. In a country so dry and brown every green thing is beautiful, and Persian poets sing of the rose gardens of Shiraz, the chief town of Southern Persia, a blue-tiled city set among cypress groves. It is one of the oldest cities of Persia, on the site of the capital of the ancient Persian empire of Cyrus. The coast of the Persian Gulf is hot, dry, and barren, with oases of palm trees to break its monotony. Bushire and Bunder Abbas are the ports.

804. Irrigation in Persia. In Persia, underground rivers sink through the limestone, and are largely used for irrigation. They are reached by sinking wells, and are connected by underground channels, so that no water is lost by evaporation under the hot summer sun. These underground channels, or kanats, can be traced for many miles by the mounds of earth thrown up in excavating them. Where the subterranean river crops out at the surface a spring and oasis are formed.

805. Arabia. Find the high tableland of Arabia in the map. It is in the driest belt of Asia, and is rainless except on the higher parts. A fertile strip along the Mediterranean belongs to Turkey. There are no permanent rivers, but streams flow in some of the higher valleys. Springs or wells are also found, surrounded by oases of palm trees. The date palm likes water at its roots and a scorching sun, and its fruit is spoiled by a single shower. The other plants are thorny or gummy, and some gums and resins are exported. The wild animals include the ostrich and gazelle, and the camel and horse are the chief domestic animals. The richest valleys open from the highlands of Nejd in the interior, which are high enough to condense the clouds. The inhabitants, often called Bedouins, either live in mud villages in the cultivated valleys or in skin tents in the dry scrub on the margin of the desert. Many add plunder to their other trades. Thousands of pilgrims go every year to visit Mecca and Medina, both associated with the life and death of Mohammed the founder of their religion. This traffic is so important that a railway has been built from Damascus to Medina (§ 780). The extreme south of Arabia, Yemen, is in the monsoon belt. The mountain slopes are terraced, and fine coffee is grown and exported from Mocha. The moisture of the sea fogs ekes out the scanty rainfall. Oman, on the Persian Gulf, has important pearl fisheries.

Exercises

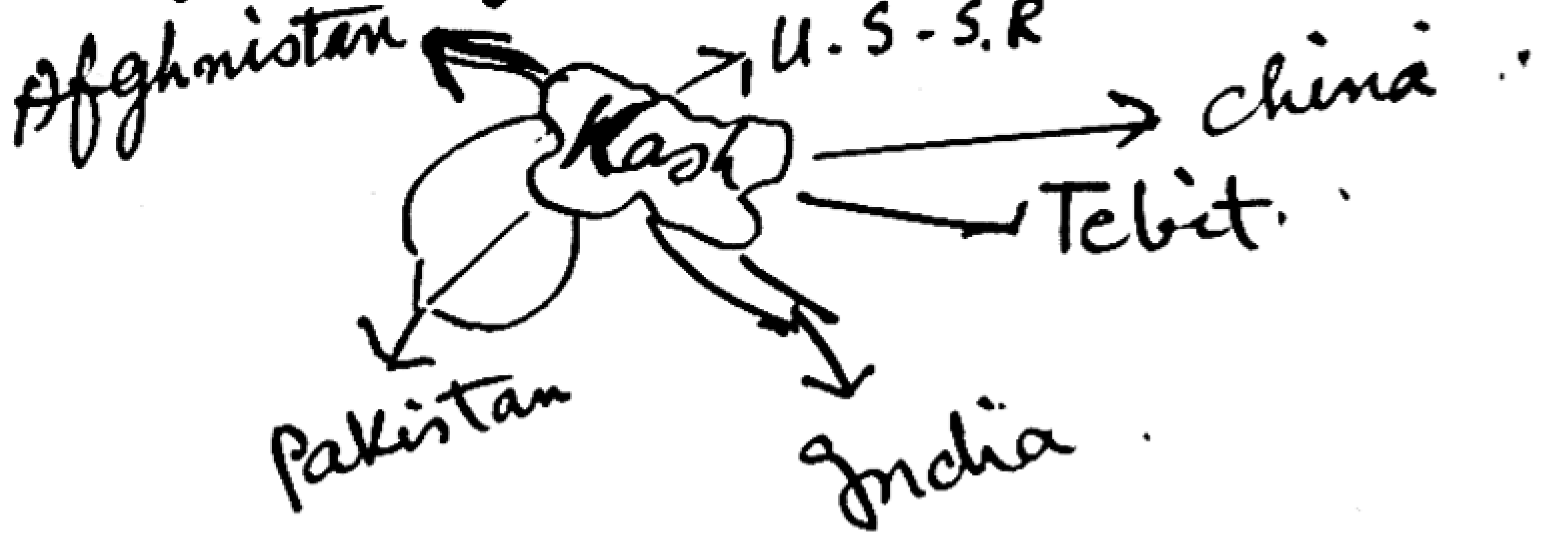
1. Describe fully what is meant by a desert climate.

2. Show how the geographical conditions of a desert region affect the occupations, the daily life, and the character of the people.

3. Explain and account for the position of the oasis towns of Chinese Turkestan, and name the most important.

4. Mark on a map Herat, Kabul, Kandahar, Mecca, Samarkand, Tashkent, Teheran, and the Trans-Caspian Railway.

Naw [illegible] Kashmir



CHAPTER IX

THE WETTER LANDS OF THE MOUNTAIN BELT

806. Wet and Dry Mountain Regions. The mountains and plateaus of Western and Central Asia are the driest part of the mountain belt. Their rivers flow either to frozen seas, or to lakes in basins of inland drainage, or lose themselves in the deserts. In the wetter belt the mountains give birth to great rivers which flow to well-watered and populous lowlands.

807. The coloured map shows that all the highest mountains of Asia meet in the Pamirs, where the mountain barrier between the northern and southern plains is lowest, and four empires have posted their soldiers on the Roof of the World. The Pamirs are the key to the geography of Asia. In them rises the Oxus, which receives tributaries from the high, wild, and little-known ranges of the Hindu Kush to the west. The Tian Shan, Kwen Lun, and Himalayan ranges also spring from the Pamirs; but while the valleys of the Tian Shan and Kwen Lun carry but little water, the Himalayan ranges feed many great rivers. The forested ranges of Indo-China are also well watered, and some of the longest rivers in Asia flow from the mountains of Eastern Tibet. The Pamirs thus separate the drier from the wetter parts of Asia.

807a. There are dry lands east of the Pamirs as well as west of them, but most of the wetter mountain lands are east of the Pamirs.

808. The Himalayas. The Himalayas are the greatest mountain system in the world, though by no means the oldest. The Earth's crust was thrown into complicated folds, forming high ranges with deep valleys between. The direction of the rivers on our maps shows how these parallel ranges and valleys are arranged. Notice their direction carefully. The Himalayas are young mountains, little worn down as yet. The floors of the highest valleys are higher than the highest peaks of the Alps, and many peaks are over 5 miles high. Among these are Everest (29,000 feet), rising above the Brahmaputra valley, the highest mountain in the world: Kanchenjunga (28,200 feet), in the Sikhim Himalayas: Dhaulagari (26,800 feet), in the Central Himalayas; and Nanga Parbat (26,600 feet), in Kashmir, often called the most beautiful mountain in the world. The depth of the valleys matches the height of the peaks. Wild streams rush down every valley from the glaciers above, and flow in deep gorges to the main valleys. East of the Tsan-po or Brahmaputra valley the ranges and valleys change their direction, and run south. There is no general name for this mountain region, which is vaguely called Indo-China.

809. The Himalayas are commonly taken as extending from the gorge of the Indus to that of the Brahmaputra, a distance of about 1,500 miles. In the west they are from 250 to 360 miles from north to south, but in the east they are only half as broad. Few of the passes are less than 17,000 feet, or three miles, high.

810. Himalayan Rivers. The map shows that all the Indian rivers rise in Tibet behind the southern ranges of the Himalayas. The Sutlej, the chief tributary of the Indus, flows out of Lake Manasarowar, in Tibet, which is sacred alike to Buddhists and Hindus. The sources of the main stream of the Indus, the Brahmaputra, and the Gogra tributary of the Ganges are quite near. The Indus-Brahmaputra valley is really a single great valley, drained in opposite directions by two long rivers, which are separated by a low divide.

811. All the Himalayan rivers have steep and rapid courses and carry down much rock waste. This they spread out either over high flat vales, like that of Kashmir, or on the lowlands at their base. In this way the Himalayan rivers have built up the plains of Northern India out of the rock waste of the Himalayas between these mountains and the older tableland of the Deccan. The rivers of China have built up lowlands along the Pacific in the same way, and the rivers of Indo-China have also built up alluvial lowlands.

812. Himalayan Scenery. The southern slopes of the Himalayas face the monsoon winds and receive heavy rains, and are heavily forested. The heavy rainfall of the Khasi Hills of Assam has already been noted (§ 698b). Travellers have described the rich forests of the southern slopes of the Himalayas, and the blazing colours of the rhododendrons which grow still higher. On the wetter slopes the terai, or tropical jungle, is found up to about 3,000 feet. Tea has been planted where the terai has been cleared, especially in Assam. Deciduous forests are found up to about 7,000 feet, and evergreen forests of pine and cypress (deodar) to 12,000 feet. Above are Alpine pastures, glaciers, snowfields, and the higher peaks. The lee slopes of these ranges and the inner ranges are dry, barren, and treeless. The snow line on the southern ranges is about 15,000 feet.

813. Trade Routes. We should not expect to find many routes across this broad high mountain barrier, but traders have always used them. Trade begins with luxuries, not necessities, and the mountains of Central Asia supply many precious wares. Among them are the turquoises of Persia, the rubies, emeralds, and diamonds of India and Burma, gold and silver, and the pale green stone called jade, which the Chinese value so highly.

Tea has also led to a busy caravan trade over some of the most difficult mountain routes of Asia.

814. The routes from Iran to India by the Khaibar and Bolan Passes have already been mentioned (§ 799). Difficult routes lead from Russian Turkestan to India by the Hindu Kush and the Pamirs. Other routes start from Kashgar or Yarkand, and climb precipitous valleys to the high passes of the Karakoram ranges (Mount Godwin Austen, 28,260 feet), to Leh in Kashmir, and follow the wild gorges of tributaries of the Indus to Srinagar, the capital of Kashmir. Long and difficult routes cross the highest Himalayas from India to Lhasa, the capital of Tibet, and are continued east across the mountains to the Chinese lowlands.

814a. Leh is built on bare hills above the Upper Indus, in a land of deep valleys and high passes. Many caravans halt at Leh every year to obtain men and supplies, for they must carry with them food, bedding, and all they need for a journey of many weeks. In its bazars traders from Afghanistan meet others from Kashmir, India, Tibet, China, Mongolia, and Russian and Chinese Turkestan. A merchant bound for Kashgar must face the glaciers and high passes (15,000 feet) which separate the valley of the Indus from that of its tributary the Shyok, and then cross the still higher passes of the Karakoram Mountains, and make his way down wild valleys to the Tarim and Chinese Turkestan. Travellers to India cross passes to the Sind tributary of the Indus to reach Srinagar, where the worst of the journey is over. Leh is only as far from Kashmir as London is from Carlisle, but a traveller does well if he covers the 300 miles in three weeks.

815. Life in Highest Asia. Many kinds of life are lived in this mountain region. Wandering shepherds drive their flocks to the high valleys of the Pamirs and pitch their dark skin tents in the high treeless valleys, which are only free from snow for a few weeks in summer. The Pamir plateau lies about 2 miles high above the sea and is crossed by ranges about a mile higher. The Pamirs are the high level valleys which lie between these ranges. Shallow rivers flow through these swampy valleys, which contain many lakes (Fig. 144). For a few weeks the land is gay with grass and flowers, but the first frosts come early, and a covering of ice at night shows that winter is at hand.

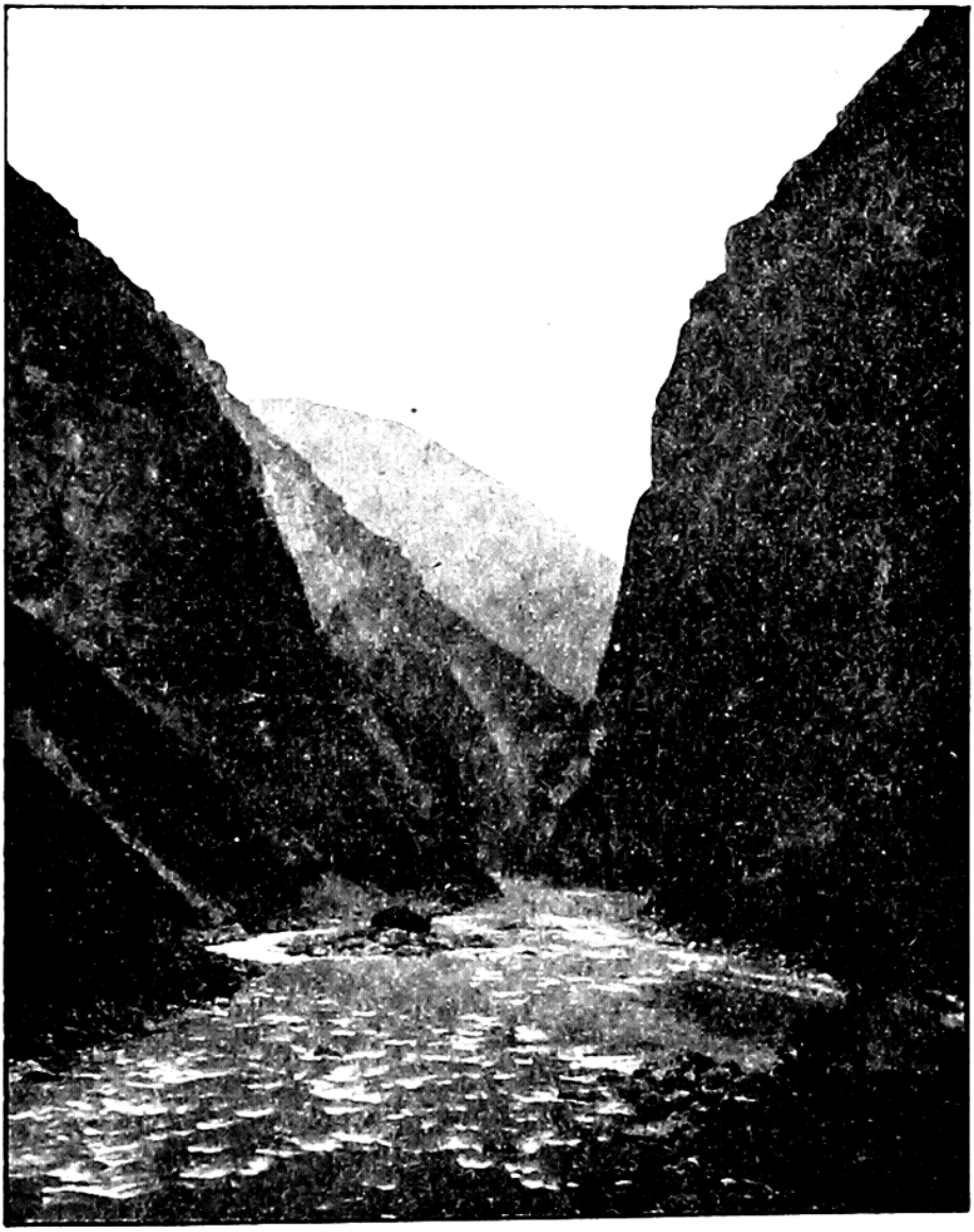


Fig. 16. A Himalayan Gorge.

816. In other mountain valleys life is like that in the poorer oases of the desert. The hill slopes become steeper, the valleys narrower and more inaccessible, the rivers swifter, the soil more scanty, and the climate more severe. The little hill villages of the upper valleys of the Hindu Kush are built on fans of alluvial soil where tributary streams flow in. These are carefully terraced and irrigated, and planted with such cereals and fruit trees as will ripen during the short, hot, dry summer. Apricots, mulberries, and peaches are grown at a great height, and the fruit is dried for winter use. Some cattle are kept, but the pastures are poor, and they yield little milk. They are valued chiefly for their skins and hair, which are made into clothes and utensils, and for their droppings, which are the only fuel. The villagers seldom know much of the country, for travelling is difficult. The valleys are too narrow for roads to be made, and the rivers too deep to ford. Rafts placed on inflated goatskins are often used for crossing these torrents, as in the Euphrates valley (§ 783a).

817. Kashmir. Life is easier in the fertile vale of Kashmir, the level upper valley of the Jehlam, a tributary of the Indus, which flows through the Wular Lake and rushes down the forested slopes of the Himalayas for 5,000 feet to the plains of the Punjab below (§ 839). Poets have described Kashmir as an earthly paradise, with fields of iris, gardens of roses, and perpetual summer. In reality it is barren, except in the vale itself and along the rivers. It rises to Afghanistan on the west, and to Tibet on the east, and the ranges of the Himalayas and the Karakorams shut it in on the north. This wild country is crossed by high ranges, cut by deep river gorges, and is fit only for grazing in summer. Weaving is an ancient art, and Kashmir rugs and shawls are famous. Beautiful ornaments are made of local silver and precious stones. The capital is Srinagar, near Lake Wular.

818. Tibet. Kashmir lies open to India on the south, but Tibet is shut in by high ranges on every side. Northern Tibet consists of innumerable and little-known mountain ranges and is swept by icy gales and snow storms. Only the valleys of Southern Tibet are permanently settled. These lie two or three miles above the sea, and are filled with deep alluvial soil brought down by the rivers. The hill slopes are terraced and the valley floors are irrigated and cultivated with crops which suit a short, hot, dry summer and a long cold winter. Most of the people dwell in poor villages in the valleys drained to the Brahmaputra, and live partly by agriculture and partly by pasturing yaks, sheep, and goats on the high pastures. The larger towns have huge high jongs, half forts and half temples. There are many monasteries and only a fraction of the people marry. This keeps population down to the level of the food-supply. Tibet is a Chinese dependency, and is closed to Europeans. A British force occupied Lhasa, the capital, in 1904, but was afterwards withdrawn. Lhasa is built in the irrigated valley of a tributary of the Brahmaputra, and is a picturesque city. The most imposing building is the palace-temple of the Dalai Lama, the Buddhist Pope. Its crimson roofs and gilded domes crown a hill which dominates the city. Pilgrims come to Lhasa from every part of Buddhist Asia. Nearly all the arts of Tibet are connected with religion, but beautiful jewellery is made from the silver and precious stones found in the mountains.

818a. The yak is as important in Tibet as the reindeer is in the tundra or the camel in the desert. Its thick woolly coat protects it against cold, and supplies material for clothing, tents, utensils, and even boats. Its milk is a valuable food in so poor a country, and is made into a kind of rancid butter. This is mixed with barley into a thick gruel, or served in tea instead of milk. The tea is coarse brick tea brought from China over high passes on the backs of yaks. The yak is the only beast of burden which can live at great heights,

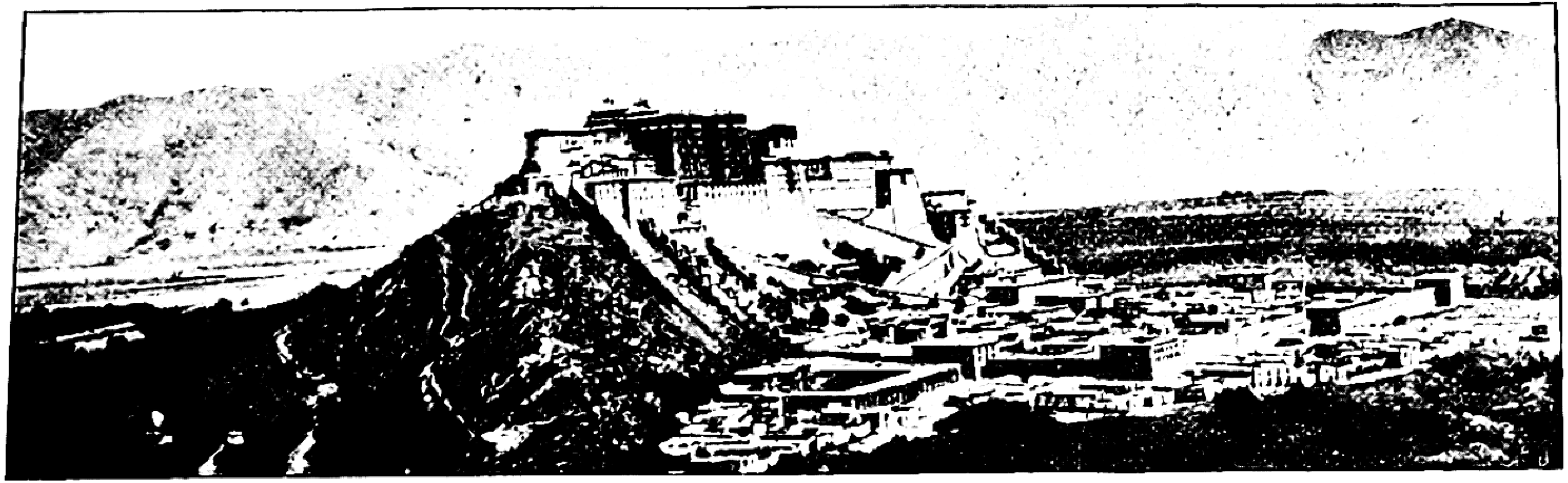


Fig. 17. The Dalai Lhama's Palace and Temple.

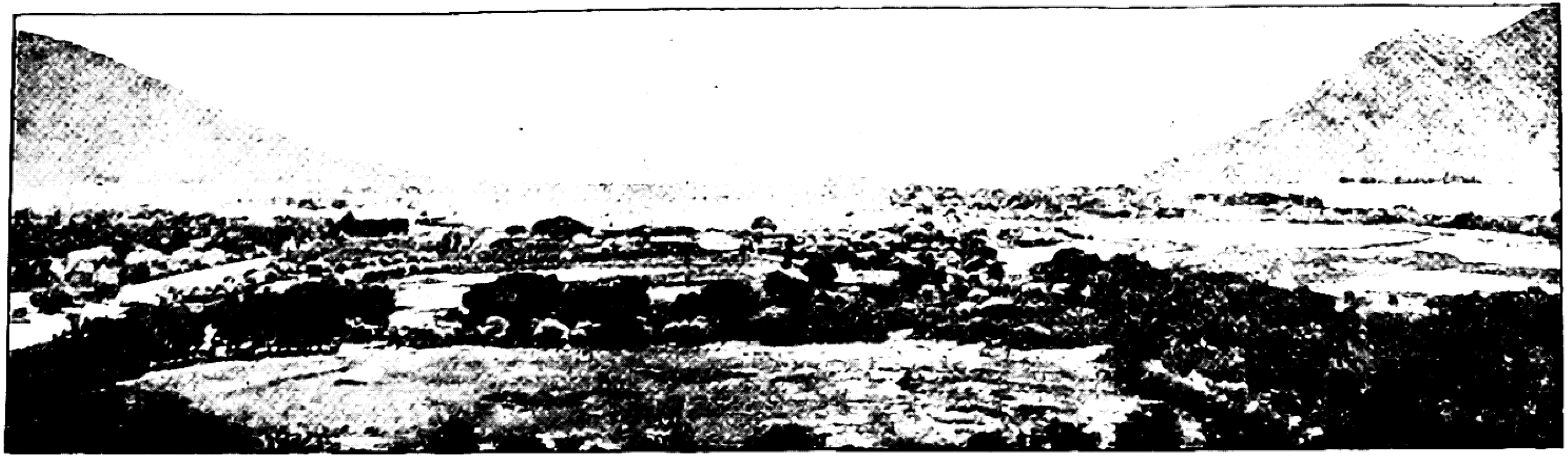


Fig. 18. The Plain of Lhasa.

and it is also used for ploughing. Its droppings are the only fuel in this cold treeless region, and are so precious that the smoky fires are used only for cooking and never merely for warmth.

819. Other Himalayan States. Nepal and Bhutan are independent Himalayan States. They contain many of the finest peaks and largest glaciers in the Himalayas, but are closed to Europeans. Every kind of vegetation is found, from dense tropical jungle to high tundra. Many of the valleys are fertile and well cultivated. The Ghurkas of Sikhim, a race of warriors, often volunteer for service in the Indian army, and make fine soldiers. Sikhim, shut in by Tibet, Nepal, and Bhutan, is under British protection, for it controls the easiest passes into Tibet. Darjiling (§ 846) is the summer capital of the Bengal Government. The scenery is imposing, but the dense forests and deep river gorges make communication difficult. The ancient handicrafts of Asia, fine weaving, embroidery, ivory carving, jewellery, &c., are still practised. The towns are little better than villages. Buddhism is the religion.

Exercises

1. Describe the climate, vegetation, and human life in the Himalayas.
2. Write short accounts of (*a*) Kashmir, (*b*) Tibet, describing the occupations and mode of life.
3. Why can man live at a greater height in Asia than in Europe?

CHAPTER X

INDIA AND CEYLON

I. CLIMATE AND PRODUCTS

820. Compare the coloured map with Fig. 19 and with the wall map. India consists of several well-marked natural regions: (i) the northern mountain region already described, (ii) the Indo-Gangetic plains at their base, (iii) the tableland of the Deccan which forms peninsular India, (iv) the island of Ceylon, and (v) the valleys and mountains of Burma.

821. Our Indian Empire contains over 1,500,000 square miles, and is a continent rather than a country. Considerably more than half-a-million square miles are ruled by native princes under the British crown. It contains 300 million peoples of many races, languages, and customs. Some of its cities are the most splendid in the world, while half-naked savages live in its jungles.

822. Climate. The climate of India is affected by its latitude, by its varied height, and by the vast ocean which surrounds it. By far the larger part of the country lies within the tropics, and has a tropical climate at sea-level. The highest peaks of the northern mountains have a polar climate, and between the two there is every possible range. Most of the country with a height of 7,000 feet and over is suitable for Europeans.

823. Some figures for the temperature have already been given, but they are repeated here. There is a great difference between Northern India, where the winters are cool and frosts sometimes occur, and Southern India, which has warm winters as well as hot summers at sea-level. Northern India is either outside or only just within the tropic, and the winter Sun is much lower than the summer Sun. This affects the heat of its rays.

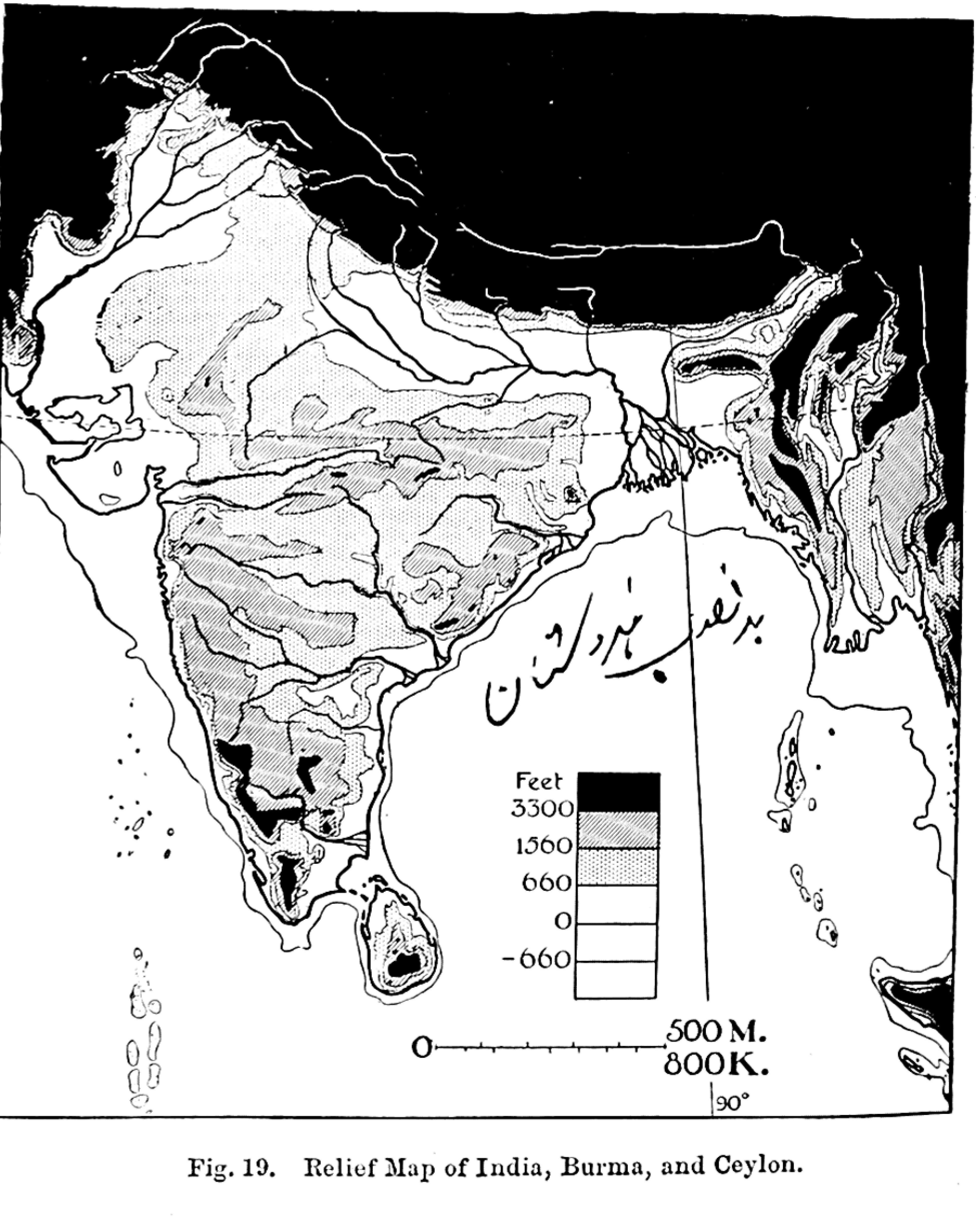


Fig. 19. Relief Map of India, Burma, and Ceylon.

In Southern India the Sun is almost overhead throughout the year, and the days and nights are roughly twelve hours long. Southern India has therefore more hours of hot sunshine than Northern India.

Place.	Latitude, N.	Longitude, E.	Height in feet.	Temperature, Coldest Month. Fahrenheit.	Temperature, Hottest Month. Fahrenheit.
Calcutta	22° 32′	88° 24′	20	65·1	85·6
Bombay	18° 55′	72° 54′	35	74·5	84·6
Rangoon . . .	16° 47′	96° 13′	40	74·7	85·0
Madras	13° 04′	80° 14′	10	75·4	88·7
Colombo . . .	6° 56′	79° 56′	40	79·0	82

824. The most important feature of the Indian climate is its rains. These are brought by the monsoon winds, which have already been explained (§§ 697, 8). They fall in the summer months, when the monsoon winds are advancing north. Madras is an exception. It is in the lee of mountains which catch the advancing monsoon, and has most rain from the retreating monsoon.

825. The figures in the second table bring out many important points. The first group of places is in the Indo-Gangetic plains. Notice how steadily the rainfall diminishes inland. The second group of places is in the Deccan. Notice that the western half of the Deccan has heavier rains in July than the eastern. Mahabaleshwar is nearly as wet as Cherrapunji in July. Compare this rainfall with that of Bombay and Poona. The south-west winds reach Bombay first, but that city lies low, while Mahabaleshwar is between 4,000 and 5,000 feet high. By the time they reach Poona, on the summit of the plateau, they are dry, and Poona has much less rain in July than Bombay, though it lies much higher, for it is on the lee slopes of the Western Ghats. Mysore has two wet seasons, like many places near the equator. These occur shortly before Midsummer and

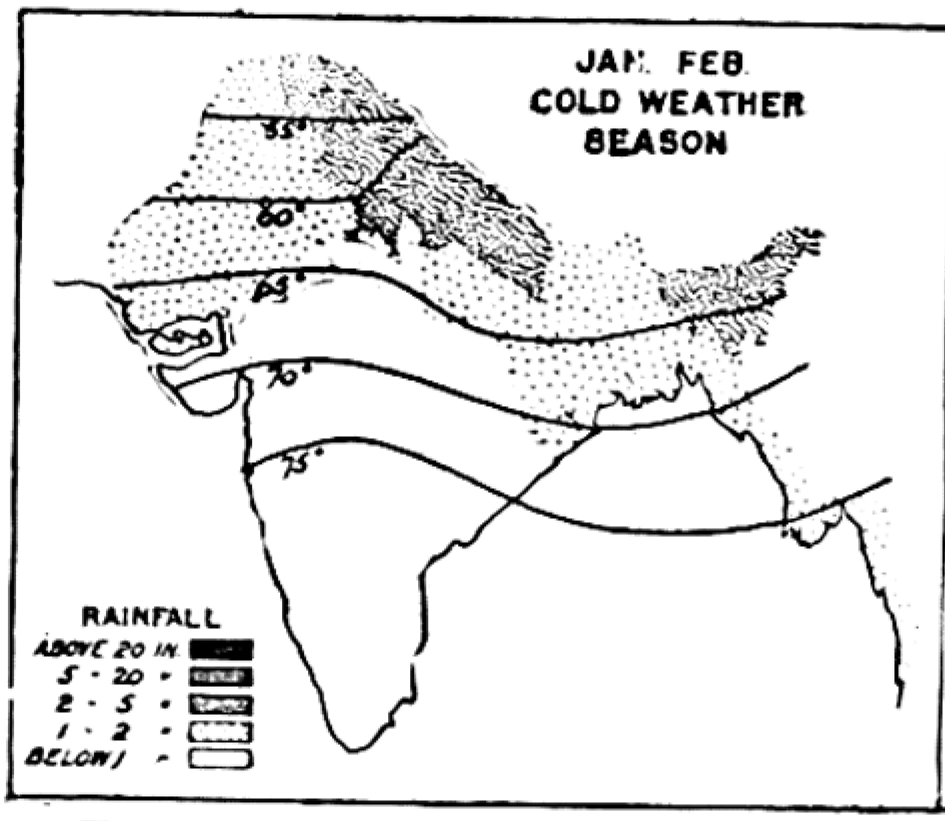


Fig. 20. Climate of India in the Cold Weather.

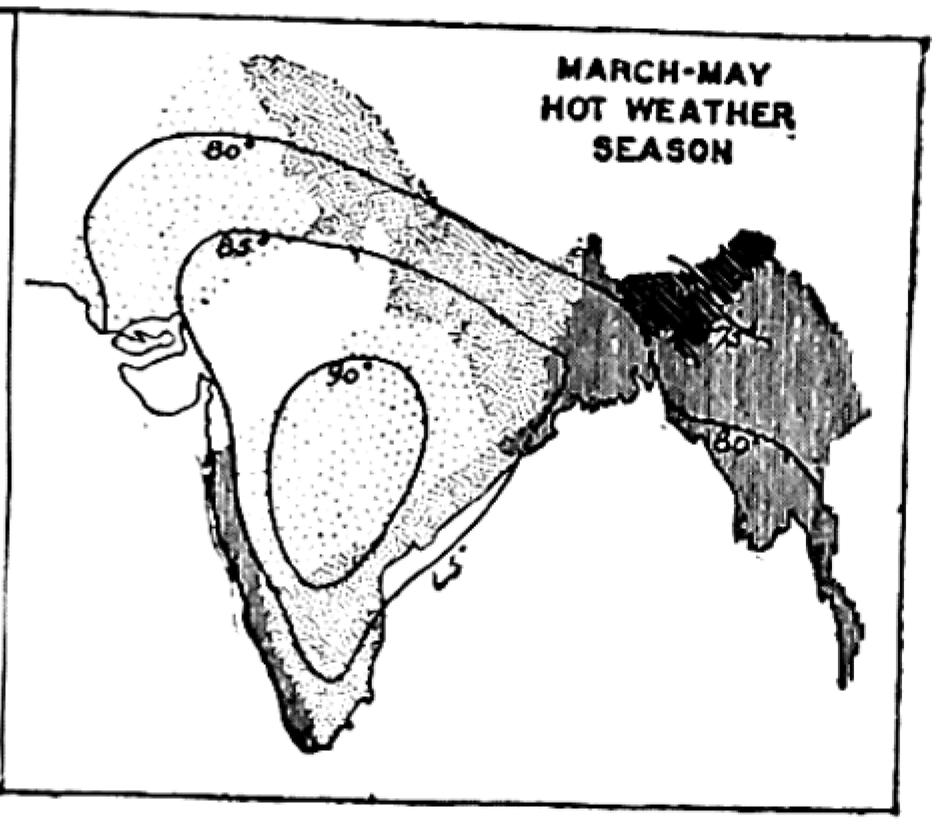


Fig. 21. Climate of India in the Hot Weather.

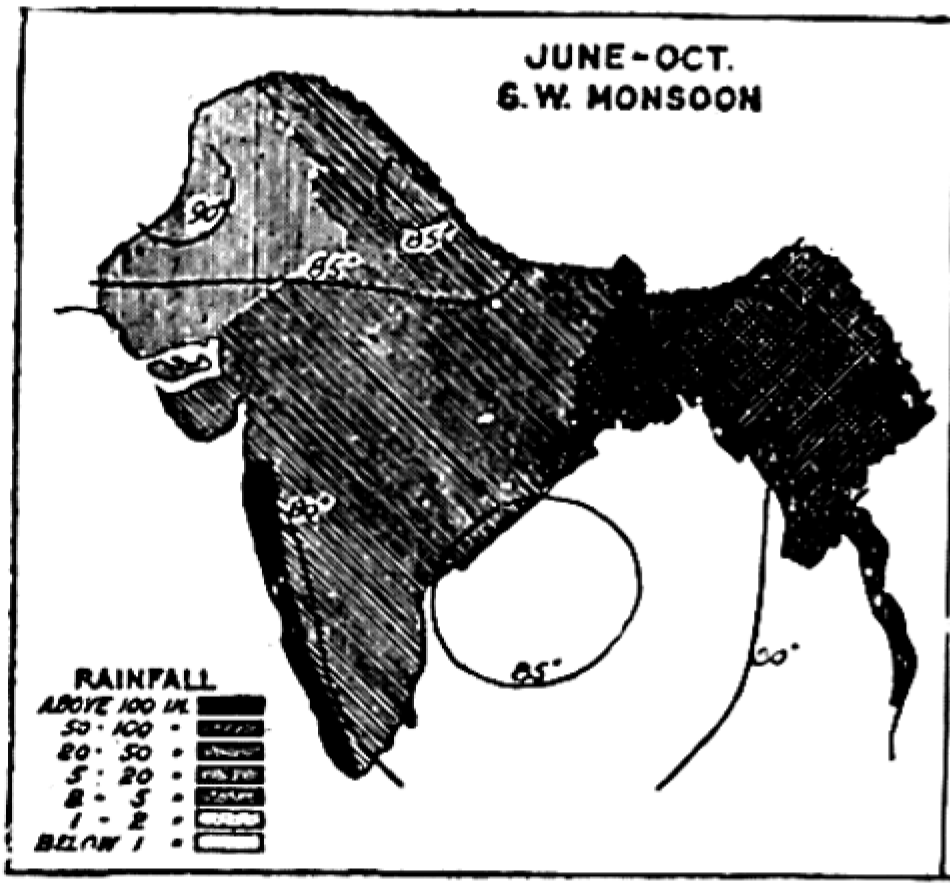


Fig. 22. Climate of India in the Rains.

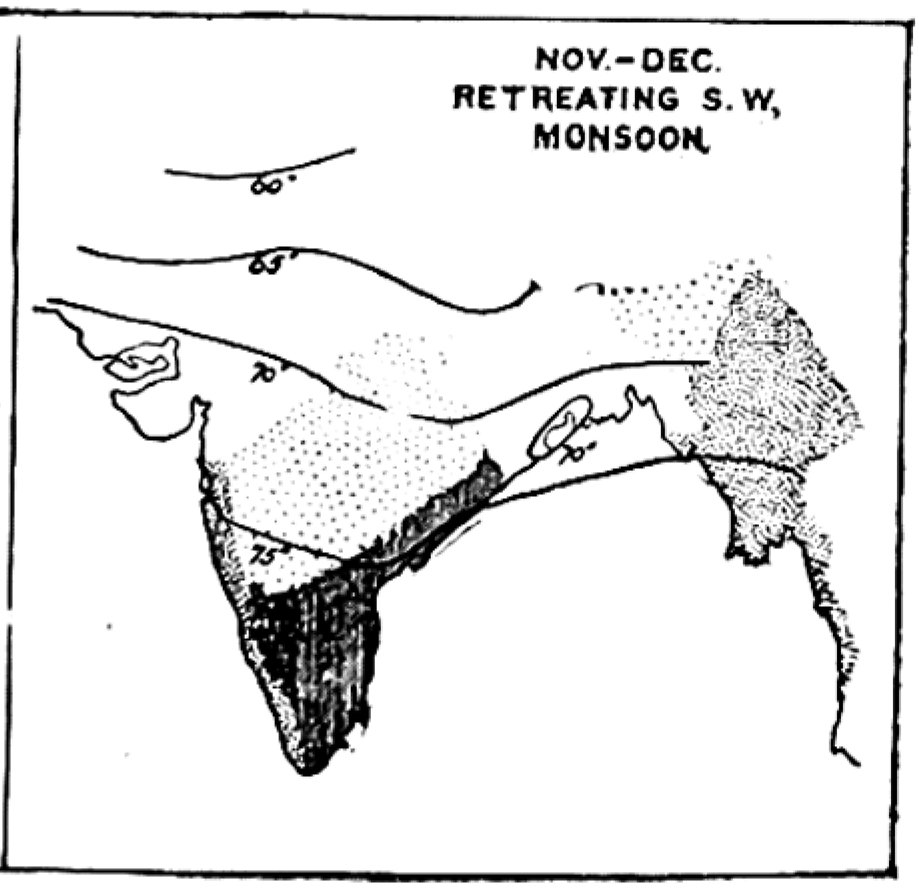


Fig. 23. Climate of India in the Retreating Monsoons.

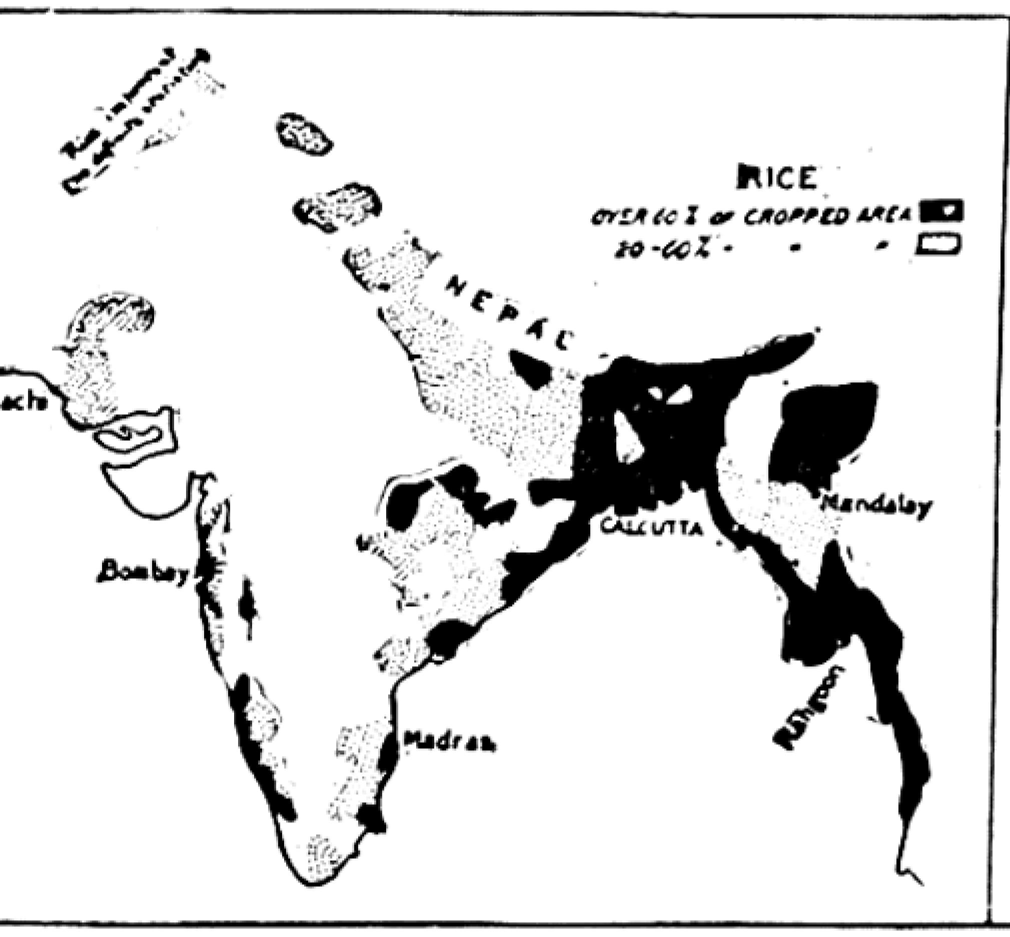


Fig. 24. Distribution of Rice in India.

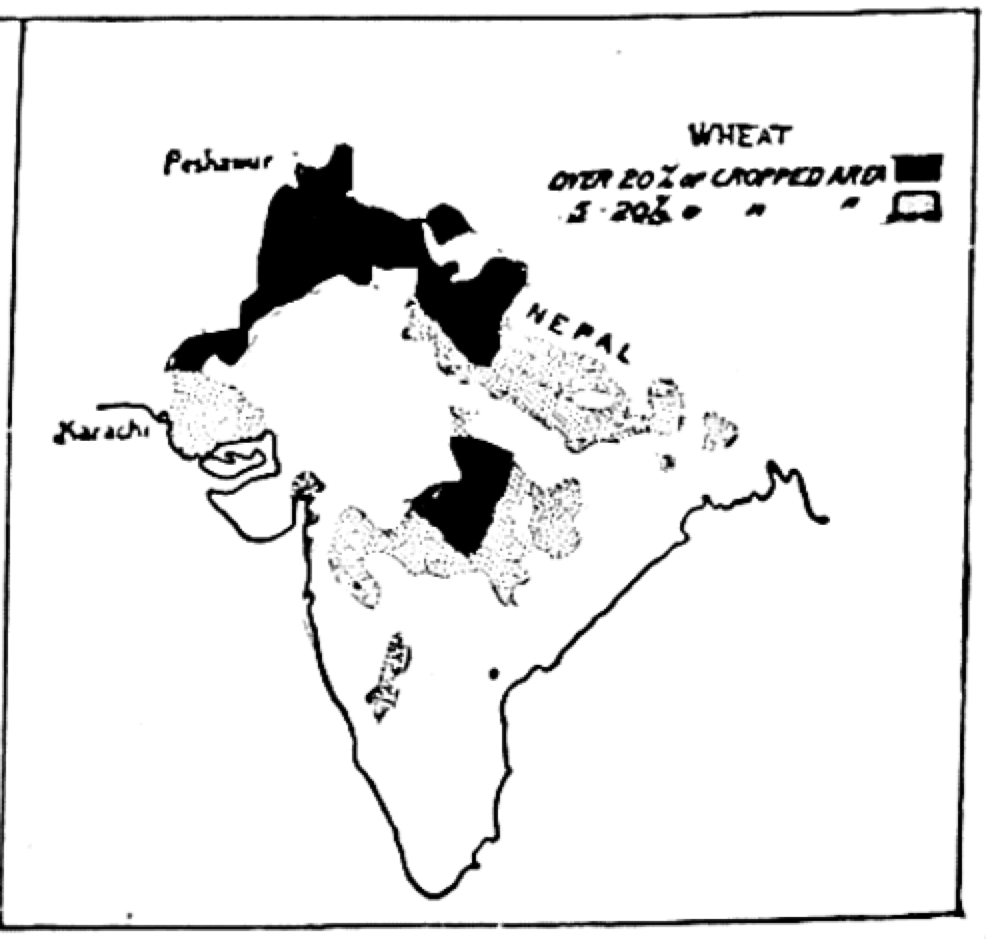


Fig. 25. Distribution of Wheat in India.

Christmas, when the Sun is vertical over the equator. Madras would also have two wet seasons if the lie of the land and the trend of the coast were different. Rangoon, in Lower Burma, is in almost the same latitude as Bombay and at about the same height. July is the wettest month in both, and the rainfall of the two is not very different.

Place.	Latitude.	Longitude.	Height in feet.	Rainfall in wettest month.
Calcutta . . .	22° 32′ N.	88° 20′ E.	20	13 inches (Aug.)
Benares . . .	25° 20′ N.	83° 0′ E.	260	13 ,, (July)
Agra	27° 10′ N.	78° 5′ E.	560	10 ,, (July)
Lahore	31° 34′ N.	74° 20′ E.	720	7 ,, (July)
Bombay . . .	18° 54′ N.	72° 49′ E.	35	25 ,, (July)
Mahabaleshwar .	17° 57′ N.	73° 40′ E.	4,540	106 ,, (July)
Poona	18° 28′ N.	74° 10′ E.	1,840	7 ,, (July)
Madras . . .	13° 4′ N.	80° 14′ E.	25	13 ,, (Oct.)
Mysore	12° 18′ N.	76° 10′ E.	2,500	5 ,, (May) 7 ,, (Oct.)
Rangoon . . .	16° 47′ N.	96° 13′ E.	40	21 ,, (July)

826. The next table shows more clearly the double wet season of Southern India and Ceylon. In some cases the heaviest rainfall is brought by the winter rains, which we may call the retreating monsoon.

Place.	Latitude.	Longitude.	Height in feet.	Spring Maximum.	Autumn Maximum.
Mysore . .	13° 4′ N.	80° 14′ E.	2,500	5 (May)	7 (Oct.)
Trivandrum	8° 29′ N.	76° 59′ E.	195	12 (June)	9 (Oct.)
Colombo .	6° 56′ N.	79° 52′ E.	40	12 (May)	14 (Nov.)
Kandy . .	7° 18′ N.	80° 40′ E.	1,655	9 (June)	12 (Oct.)

827. The duration of the monsoon winds is very much longer in some districts than others. The following table gives a few selected figures. Notice that in Bombay the monsoon rains last almost twice as long as in the dry Eastern Punjab, reaching it nearly a month earlier, and retreating a month later. This affects the total rainfall in a marked way.

District.	Beginning and end of Monsoon rains.	Days.
Bombay	June 5—Oct. 15	133
Central Provinces . .	June 10—Oct. 15	128
Bengal	June 15—Oct. 31	139
Central India . . .	June 15—Sept. 30	108
Rajputana	June 15—Sept. 20	98
Upper Ganges Basin .	June 21—Sept. 30	98
Eastern Punjab . .	July 1—Sept. 15	77

828. The last table shows the mean annual rainfall for the year as well as for the wettest month. Cherrapunji, in the Khasi Hills of Assam, is the wettest place in the world. In July it is little wetter than Mahabaleshwar, but Mahabaleshwar has rains only during the monsoon while Cherrapunji has them for the greater part of the year, and its rainfall for the year is nearly twice as great. The rainfall of Bengal decreases towards the interior. Bombay and Rangoon, which are more fully exposed to the southwest monsoon, are both wetter than Calcutta. Poona and Mysore are both rather dry, owing to their position in the lee of high ground. The rainfall of Colombo is less than that of Rangoon, a proof of the violence of the monsoon rains at exposed places.

Place.	Mean Annual Rainfall.	Wettest Month.
Cherrapunji . .	458 inches.	July
Calcutta	61 inches	August
Benares	39 ,,	July
Agra	27 ,,	July
Lahore	21 ,,	July
Bombay	74 inches	July
Mahabaleshwar .	268 ,,	July
Poona	28 ,,	July
Mysore	29 inches	May and Oct.
Madras	49 ,,	November
Colombo	88 ,,	May and Nov.
Rangoon	99 inches	July

829. The division of the year into wet and dry seasons has important consequences. Agriculture began early in the monsoon lands, where rain could be counted on in the hottest seasons. Probably at first only a single harvest was raised in a year, as in our own country. Later, rain was stored for use during the dry warm winter and two or more harvests were raised. The storage of water for winter crops is very important all through India. Great princes have shown their public spirit by making immense reservoirs or tanks, which are really artificial lakes. The largest in the Deccan has a circumference of 30 miles. Thus in most of India agriculture goes on all the year round, and the land does not lie fallow in winter as it does in this country. In the cooler north such temperate crops as wheat are planted in winter.

830. Plants of India. An ancient settled land like India, with a tropical climate, and good methods of irrigation and water storage, produces an immense variety of plants. The forests on the wetter slopes are richer than any thing we know, and the very names of many of the trees are strange. Both deciduous and evergreen trees are found at different heights, and many produce delicious fruits and gorgeous flowers. India is a land of princes, and palace gardens have long been planted with rare and beautiful trees. Among the commonest Indian trees are the pipal, or sacred fig, the banyan with its buttressed trunk, and the tamarind. Palms are most numerous in Ceylon, the hottest part of India. The coco-nut palm likes a hot climate and sea air. On the other hand, the date palm can endure cold winters, and prefers a dry climate if the roots can obtain water. It grows farther north in India than any other palm. Teak and sal are strong timber trees, and other woods, e.g. sandal wood and satin wood, are valued for their beauty. Sandal wood has a fragrant smell which lasts for many years. Among the fruits are the banana, pineapple, mango, custard apple, and water melon. The cereals of a country are always among its important crops. Wheat is grown as a winter crop in the northern plains, and much is exported from Karachi, the port of the Indus. Rice is grown everywhere in warm low plains, and especially in river deltas, which are swampy and often flooded. It is less nourishing than wheat, and the wheat-eating races of the world are stronger and more enduring than the rice-eaters, though the rice lands can feed a far denser population. Millet, which will grow on almost any soil, is the food of the poorest people of all, and the least nourishing. Sugar, coffee, and tea are important crops in some districts. Two fibre plants are largely grown, jute in Bengal and cotton in the Deccan. Dye woods, drugs, spices, perfumes, and strong-tasting plants which flavour insipid rice or millet (ginger, turmeric), and oil seeds are also staple crops.

831. Animals. The forests of India are the home of many wild animals. The tiger is the best known of these, but there are also leopards, bears, hyenas, wolves, jackals (the scavengers of the villages), antelopes, deer, and many monkeys. The elephant is found in the jungles, and is used instead of the horse on state occasions, and for heavy work. Poisonous snakes are common, and thousands die of snake-bite every year. Crocodiles are found in the rivers, and there are innumerable insects. The tiny fleas which live in the fur of rats are the great disease-carriers of India. The camel is used in the driest and the buffalo in the wettest parts, and different breeds of humped cattle everywhere. Horses are used for riding but not for draught.

831 a. Cows are kept for milk where the pastures are good and the climate is not too hot; but beef is not used as food by many sects. The vast majority of the people are vegetarians, partly from poverty and partly from religious convictions.

832. Occupations of India. Agriculture is by far the most important occupation, and most of the land belongs to the peasants of a village, who are governed by their headman. Many have never seen a white face. The great towns which cover India house but a fraction of its millions. No labour is grudged to make the soil yield its utmost, and two all-important things, water and manure, are carefully collected, stored, and used.

833. The life of the great towns is very different from that of the villages. India has been conquered and reconquered so often that there are innumerable great cities many of which are, or have been, the capitals of princes who grew rich on the labour of their peasants. Every kind of decorative art grew up in these royal cities, for gold, precious stones, silk, cotton, metals, and labour were abundant and cheap. The chased Benares brass is familiar in England. Indian silver jewellery is exquisite in design, and inlaying, ivory and wood carving were brought to perfection. The silks, muslins, and cottons were spun by hand into the finest tissues, and these were often exquisitely painted and embroidered. Architecture was elaborate, and richly decorated. Indian paintings are also of wonderful beauty. All Indian arts are remarkable for the richness of the materials used, and the infinite labour expended.

834. The coming of the European has changed town life. Machinery is replacing the wonderful hereditary skill of hand and eye. Labour is as cheap as ever, but it now turns out imitations of Western goods at very low prices, and the jute and cotton mills of Bengal and Bombay compete with those of Europe and America.

835. Still other men, numbering millions, practise neither agriculture nor any arts. They live in the hot wet jungles of the least-known parts of India, go almost naked, and subsist on forest produce.

835a. Religion may almost be classed among the occupations of India. Enormous numbers of men and women are devoted to the service of the temples, which possess costly treasures. Many, whether Hindu, Mohammedan or Buddhist, are men of great learning or piety, while others are ignorant wandering beggars living on the charity of the pious. India is full of places of pilgrimage, and rivers are especially sacred. The Ganges is the holiest of all, and to bathe in its waters washes away all sin. Dead bodies are flung into it as a pious act, and though this is dangerous to the living, it brings a blessing on the dead. Such practices as these, added to the dense population, the great heat, and the ignorance or dislike of health precautions which interfere with ancient religious customs, make disease very common. Plague and cholera slay their millions, and are never absent from the great cities, while pilgrims spread them from village to village.

836. The English in India are chiefly soldiers, officials, and traders. They mix little with the natives, and speak only a few of their innumerable languages. Most of the judges and magistrates are native Indians, many of whom have been educated in Britain.

Exercises

1. Write an account of the rainfall of India, and map the annual distribution.
2. Write short explanations of the isothermal maps in Figs. 154, 156.
3. What do you know of the occupations of India?
4. Explain the distribution of rice and wheat in Figs. 157, 158.

CHAPTER XI

INDIA AND CEYLON

II. REGIONAL DIVISIONS

837. The Plains of the Indus and Ganges. Many rivers have built up the Indo-Gangetic plains. Their waters are carried east by the Indus and west by the Ganges, both of which rise in the Tibetan Himalayas. Their basins are shut in by the Himalayas on the north and by the Deccan on the south, and are separated from each other by a low divide. The plains of the Indus and Ganges appear level, but slope slightly from the base of the Himalayas. They present a monotonous expanse of brown, green, or yellow, according to the season.

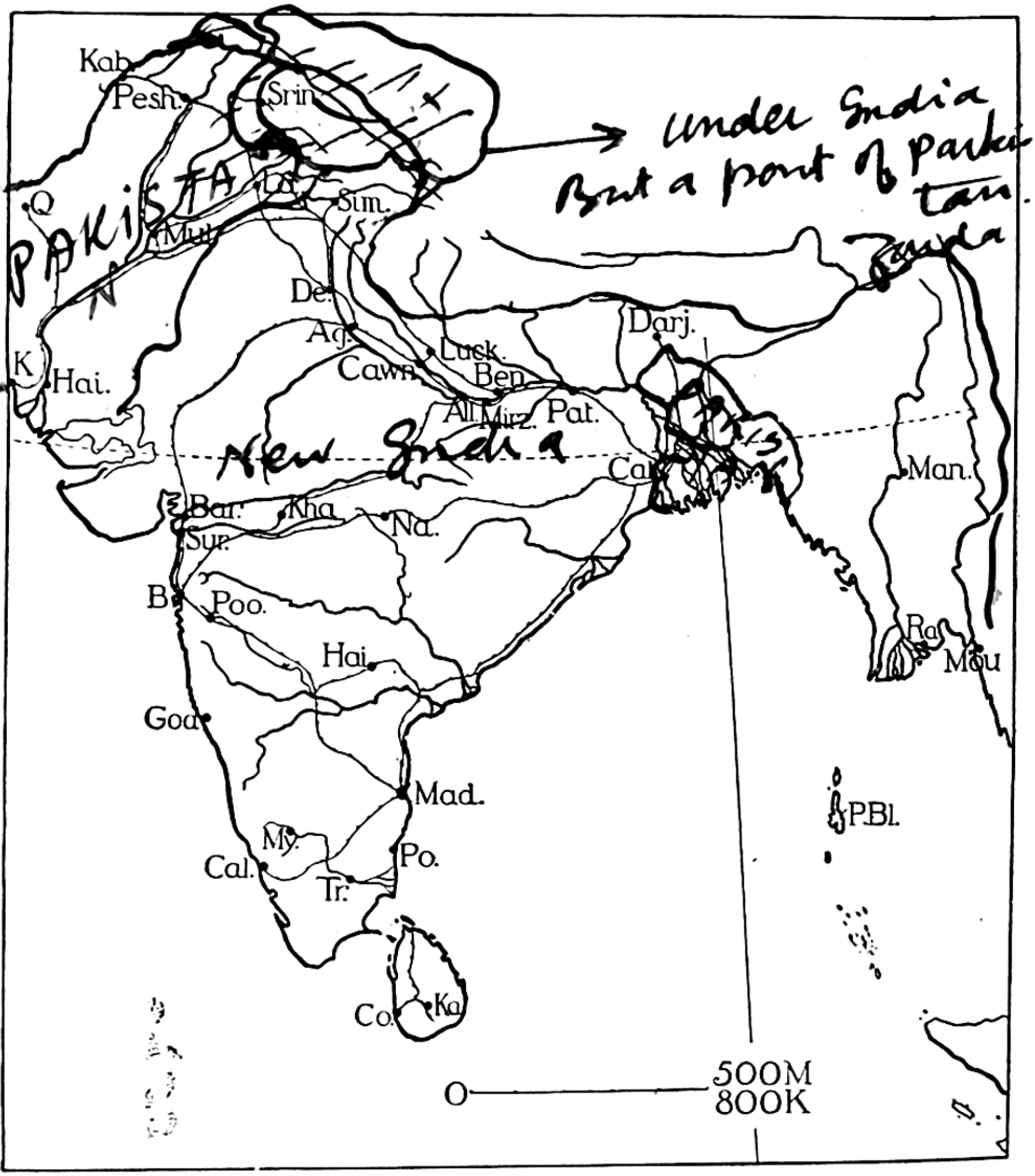
837a. The Deccan is part of an old continent which existed before the Himalayas were raised (§ 674). At a later date the seas between the Himalayas and the Deccan were gradually filled with silt brought down by the Himalayan rivers.

838. The following figures show how much drier the Indus basin is than the Ganges :—

Place.	Area in Square Miles.	Number of Stations.	Approximate Mean Annual Rainfall.
Sind and Kutch	68,000	10	9 inches
Punjab (Plain)	120,000	29	22 ,,
N.W. Provinces and Oude .	83,520	45	36 ,,
Western Bengal	38,000	10	49 ,,
Lower Bengal	54,000	29	66 ,,

839. The Indus Basin. Five great tributaries of the Indus, the Jehlam, Chenab, Ravi, Beas, and Sutlej, drain the Punjab, or 'Land of the Five Rivers'. The Punjab is the best part of the Indian basin, for though the rainfall is scanty the alluvial soil is very fertile. The rivers carry but little water except in the summer months, but when the snows of the Himalayas and Hindu Kush melt they swell into great rivers measuring

Pakistan is new one country —



under India But a part of Pakistan.

Fig. 26. Routes and Towns of India.

many miles across. Their muddy waters are loaded with rock waste, and they whirl along forest trees uprooted in some mountain landslip. The Punjab rivers have low banks, and if an obstacle dams their channel they burst their barriers and flood the low-lying plains.

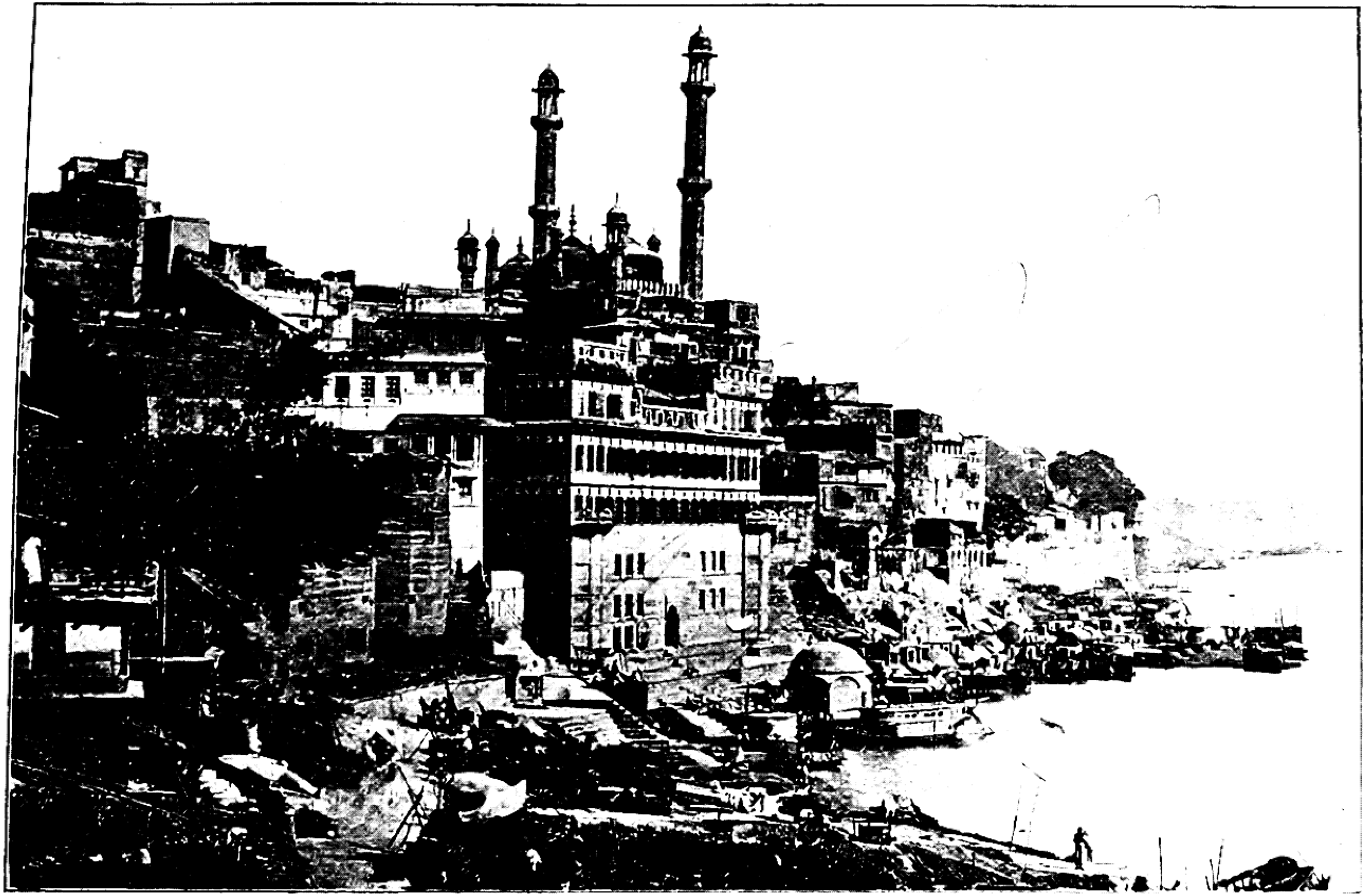
840. Within the last few years great new irrigation canals have been cut from the Punjab rivers, and districts once infertile are now covered with prosperous villages. Dams are built across the rivers to deepen the water, which flows into irrigation canals above the dams. Some canals are over 200 miles long, and carry more water than the Thames at London. These open to smaller ones, and a network of canals turns vast areas of dry soil into rich wet fertile mud. Wheat is largely grown as a winter crop and exported from Karachi, the port of the Indus delta.

841. The largest towns are on the upper courses of the Punjab rivers, in the wetter and more fertile districts near the base of the Himalayas. Lahore (730 feet), the capital of the Punjab, near the Ravi, is the centre of many railways and manufactures. Amritsar, the old Sikh capital, manufactures silk and other textiles. Multan owes its importance to its position near the confluence of all the Punjab rivers on the edge of the desert where many routes meet. Below Multan the united Punjab rivers enter the main stream of the Indus, which has followed a much longer course through the mountains. The Indus enters the plains near Peshawar, at the mouth of the Khaibar Pass, one of the most important military stations in India (§ 799). A little lower, near Attock, the gorge is crossed by the line which connects Peshawar and Lahore.

842. Sind and Rajputana. The Lower Indus crosses Sind, where irrigation is increasing. This is a rainless region, with cold winters and very hot summers. No large tributaries flow to the Indus in this part of its course, and its volume shrinks as it crosses this dry region. The chief town is Haidarabad, at the head of the delta. East of the Indus is the Desert of Thar, with fertile oases along its margin. These form the capitals of the Rajput native States, among which Jodpur, Jeypur, Nagpur, and Ajmere may be mentioned. The salt marshes of the Rann of Kutch are a continuation of the Thar desert. The Indus delta, south of Haidarabad, is made difficult to navigate by sandbanks. Karachi, the wheat port, is at its western end.

843. The Ganges Basin. The Ganges basin is far more fertile than that of the Indus, for it receives summer monsoon rains. This explains the great historical importance of Delhi. The easiest routes into India from the north lead into the dry plains of the Indus, and conquerors have always kept north of the desert, and pressed on towards the fertile Ganges plains. Thus they have at last reached Delhi, which is built on the Jumna on the margin of the desert, on the easiest route between the Indus and the Ganges. Delhi has been taken and rebuilt many times in the course of its long history, and in 1911 was made the official capital of British India.

844. The Ganges Towns. The Ganges rises in Tibet and flows parallel to its tributary the Jumna. Both rivers enter the plains by gorges cut through the Himalayas and their foot-hills. Hardwar, where the Ganges leaves the mountains, is annually visited by many pilgrims. A great irrigation canal, like those of the Punjab, carries the waters of the Ganges to irrigate the region between the main stream and the Jumna. The Himalayan tributaries bring down so much water



Frith & Co.

Fig. 27. Benares.

that 20 miles lower the Ganges is again a great river, feeding another vast system of canals. Other canals are cut at suitable points along the main stream and its tributaries.

845. The Jumna is the westernmost tributary of the Ganges. It flows past Delhi and Agra, both adorned with magnificent buildings and rich treasures by the Mogul emperors. Below Agra the Jumna receives tributaries from the Malwa plateau of the Deccan, where opium and cotton are grown. The Deccan tributaries carry but little water to the Ganges and are sometimes dry, but the Himalayan tributaries never are. Allahabad, a great manufacturing, route, and railway centre, is built at the confluence of the Jumna with the Ganges, which has flowed past the modern manufacturing city of Cawnpore. Lucknow, the old capital of Oude, is on a tributary. Below the confluence the chief towns are Mirzapur, with carpet and metal industries, and Benares, the holiest city of India, where the river is lined with temples and ghats, or flights of steps, down which pilgrims troop to wash away their sins in the river. Below the confluence of the Gogra, another long tributary (§ 810), is Patna, in a rice and opium district. The bright green rice or paddy fields are a common sight in the Lower Ganges Valley.

846. The Ganges Delta. The vast swampy delta of the Ganges is continuous with that of the Brahmaputra. Sandbanks obstruct the channels and the southern part is formed of sunderbunds, low unhealthy islands covered with jungle. Calcutta, the capital, market and port of Bengal, is on the Hughli distributary, about 80 miles from the sea. Until 1911 it was the official capital of British India, for the conquering race had come over sea. In summer the Viceroy moves his court to Simla, a station in the Punjab Himalayas, while the Bengal Government is transferred to Darjiling, in the Sikhim Himalayas (§ 819).

847. Assam. Assam consists of the Brahmaputra Valley in the north and the Khasi Hills, an outlier of the Deccan tableland, in the south. The chief crops are tea on the lower hill slopes, and rice in the river lowlands.

848. The Deccan. The tableland of the Deccan slopes gently eastwards. It falls steeply to the western coastal plains of the Malabar coast by the forested escarpment of the Western Ghats (3,000–5,000 feet). On the north it sinks by broken scarps to the plains of the Indus and Ganges. On the east the Eastern Ghats (1,500–2,000 feet) fall to the plains of the Coromandel coast. The Deccan is therefore difficult of access from every side.

849. The Western Deccan consists of old hard rocks covered with basaltic lava. This weathers to a rich fine black soil, capable of holding much moisture, in which cotton and such forest trees as teak come to perfection. The harder masses of lava remain as high steep hills standing above the general level of the plateau, and many have been fortified by native princes. Elsewhere the Deccan consists of old rocks mixed with younger sandstones, limestones, and coal-bearing rocks.

850. As the land slopes east the longer rivers flow to the Bay of Bengal. Find the Mahanadi (512 miles), the Godavari (800 miles), the Kistna (800 miles), and the Kauveri (415 miles). These form falls as they descend to the coastal plains, and are of little use as routes, though the Kauveri does and the others might supply water power. Only two long rivers flow east, the Narbada (735 miles) and the Tapti (410 miles), separated by the

Satpura Hills. North of the Narbada the plateau forms the Vindhya escarpment, and finally sinks to the Thar desert as the Aravalli Hills. Broken tablelands and scarped ridges sink to the Ganges plains and are cut by the valleys of tributaries to that river. This wild land of forested ranges and deep river gorges is the refuge of primitive tribes and wild animals. Many of the heights are the old fortified capitals of native States, now under British protection. Gwalior is one of the most imposing of these.

851. Routes of the Deccan. There are no easy routes to the plateau either from the plain or from the sea. A railway has been built from Bombay to Poona up the face of the Western Ghats. On the north the Khandwa Gap, a depression in the Satpuras, leads from the Narbada to the Tapti Valley forming a route from Allahabad to the Deccan, which is followed by the Great Indian Peninsular line. In the extreme south of the Deccan is the Palghat Gap (1,000 feet), the only break in the Western Ghats between the mouth of the Tapti and Cape Comorin. It opens a way between the Nilghiri or Blue Hills (8,760 feet) and the Cardamom Hills (8,860 feet) from the Malabar coast to the Kauveri valley and the broad plains of the Carnatic at the eastern base of the Eastern Ghats. Through the Palghat Gap a railway runs through the tobacco lands of Trichinopoli to the eastern port of Pondicherri (French).

852. Bombay. The Deccan is divided between the Bengal, Bombay, and Madras Presidencies, the Central Provinces, and many native States. The Bombay Presidency includes (i) Sind, (ii) the fertile alluvial cotton-growing peninsula of Kathiawar, (iii) the low hot western coastal plains with Bombay as their port, (iv) the Western Ghats, and (v) the western tableland of the Deccan. Surat, at the mouth of the Tapti, once a harbour commanding a fair route inland but now silted up, was the first British 'factory' or trading station in India. Bombay came to Britain in the reign of Charles II, and has a fine natural harbour on an island near the mainland, but commands no good natural routes inland. It did not become a great port till the Suez Canal opened a short route from Europe to India, and till railways had been built to connect it with the mainland, the cotton districts of the Deccan, the Ganges towns, and the eastern ports. It now manufactures immense quantities of cotton in mills supplied with modern machinery, and does an immense trade. Farther south, on the west coast, are Goa (Portuguese) and Calicut, famous for calicoes, or fine cotton cloths.

853. Madras. Madras is the capital of the Madras Presidency and the port of the rich eastern plains, where rice feeds a dense population. It is less well-situated than Bombay, for it is on a surf-beaten coast with a poor harbour and at a greater distance from Europe.

854. The Interior of the Deccan. Lying in the lee of the Western Ghats, the interior of the Deccan is dry. The chief cotton districts are in the north-west, and much of the fine teak forests have been cleared to increase the cotton area. Much of the interior consists of bare infertile rock, but fertile valleys open east to the rivers. These are not navigable for any great distance and do not make good routes. For all these reasons the Deccan is rather thinly peopled. Native chiefs fortified the steep rocky heights, and held the routes to the lowlands, and the British did not conquer the plateau without hard fighting. Haidarabad (82,700 square miles), under British protection (capital Haidarabad), is nearly as large as Great Britain. Mysore (26,000 square miles), with important goldfields (chief town Bangalore), is rather smaller than Scotland. Southern India contains many native States with fine cities and magnificently ornamented temples.

855. Ceylon (25,000 square miles) is about the size of Scotland. It is a fragment of the Deccan, separated from it by Palk Strait (which is too shallow for steamers), and crossed by a coral reef known as Adam's Bridge. Ceylon consists in the north of hot moist plains, where rice, rubber, and coco-nut palms are grown. Copra, the dried flesh of the coco-nut, is used in making soap, candles, &c. In the south the island rises to over 8,000 feet, and Adam's Peak (7,350 feet) is a famous place of pilgrimage. In these low latitudes, with great heat and a heavy rainfall, the mountains are densely forested to the summit. The rivers flow in deep forested gorges, and the scenery is remarkable for its beauty. The lower slopes of the mountains have been cleared and planted with coffee and rubber, and with tea and cinchona or quinine above. Cinnamon is one of the most important spices. Ceylon is famous for its precious stones (moonstones, rubies, sapphires) and its pearl fisheries. The chief town is Colombo, in the south-west, where the great shipping routes of the Indian Ocean converge. Kandy, the old capital, finely situated among the mountains, has famous botanical gardens.

856. Burma (over 235,000 square miles) consists of long and rather narrow valleys running north and south between lofty mountain ranges. Both highlands and lowlands are densely forested. Politically, the country is divided into (i) the little-known Shan States, in the wildest parts of the interior; (ii) Upper Burma, a region of narrow valleys; and (iii) Lower Burma, where they open out to broad flood plains, ending in swampy fertile deltas. Teak, rubber, and cutch gum are the most important forest products. Six-tenths of the cultivated lowlands of Lower Burma grow rice, and receive enough water to make irrigation unnecessary. In Upper Burma rice is also the chief crop, but requires irrigation. The Shan tribes are uncivilized, but the people of Lower Burma are Buddhists, practising many arts, and building fine cities and temples.

857. Rangoon, on the Irawadi delta, is the capital of Lower Burma, and a great rice and teak port. Fishing is very important in the delta, and rice and fish are the chief food. Moulmein is the port of the narrow Salwin Valley, and exports forest produce. Steamers go up the Irrawadi as far as Bhamo, near the Chinese frontier, which will become an important trade centre. The railway does not follow the main valley, but is carried along one parallel to it to Mandalay, on the Irawadi, the capital of Upper Burma.

Exercises

1. Draw a map of the Ganges basin, showing the chief tributaries, and marking Allahabad, Benares, Calcutta, Delhi, and Patna.
2. Draw a map of the Indus basin, showing and naming the Punjab tributaries, and marking Haidarabad, Karachi, Lahore, Multan, and Peshawar.
3. Give figures to show the difference in climate of the Lower Indus and the Lower Ganges basins. How does this affect man?
4. Describe the climate, products, and routes of the Deccan.
5. Explain fully the geographical advantages of Bombay, Delhi, Colombo, Rangoon. Mark them on a map of India.

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CHAPTER XII

EASTERN ASIA

858. The chief countries of Eastern Asia are China; the Island Empire of Japan, which has spread to the mainland opposite; the lands of Indo-China, largely controlled by Europeans with the exception of the native kingdom of Siam; and the islands lying between the Malay Peninsula and New Guinea, also largely under European administration.

859. China is a land of high mountains opening to fertile lowlands along the Pacific coast. The coloured map shows that the Hwang-ho lowland is the largest of these, and that the mountains are broadest in South China. Politically, China is divided into eighteen provinces, but the natural regions are: (1) North China, in the Hwang-ho basin; (2) South China in the Yangtse-kiang basin, and South China where the Si-kiang or West River forms the only important lowland. Included within the Chinese Empire are Manchuria, a lowland drained to the Amur, the deserts of Chinese Turkestan (§§ 794–5), and the high plateau of Tibet (§ 818).

860. Routes into China. Broad deserts and high mountains shut in China on the west, and form its western dependencies and provinces. In 1912 Russia annexed Mongolia, which commands an important route by the Kalghan Pass to Peking. The easiest route from Chinese Turkestan to North China crosses the mountainous province of Kansu by Langchow to Singan, the commercial capital of the Shensi province, in the valley of the Wei tributary of the Hwang-ho. The Hwang-ho itself is too swift for navigation, and is obstructed by sandbanks. The routes from Central

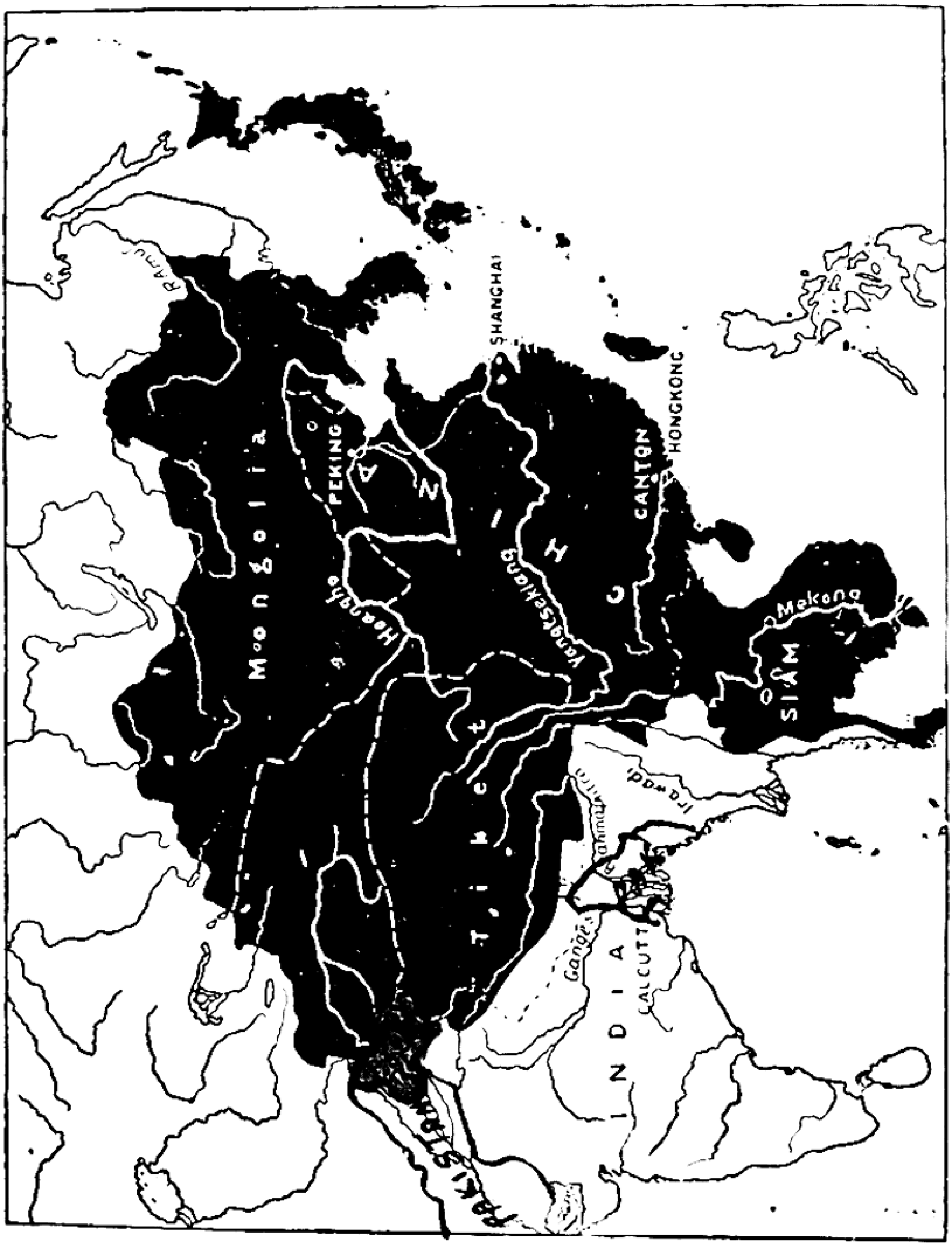


FIG. 28. The Far East.

Asia across Tibet to the Yangtse are difficult and little known, but the river is navigable for 900 miles below the Ichang gorge (§ 71).

861. Of the sea gates into China the Yangtse valley is far the best and leads to the most fertile provinces.

North of Shanghai, the Yangtse port, the best port is Kiaochow (German), on a fine harbour leading by a gap in the highlands of the Shantung Peninsula to the lower Hwang-ho. South of Shanghai are many ports, but the most important are Hongkong (British), at the mouth of the Si-kiang, on the delta of which is Canton.

862. Climate. In India the Himalayas are high enough to keep out the cold north winds which blow from Central Asia in winter. In China these blow over a great part of the country, and make the winters much colder than in the same latitudes in India. Shanghai, in the latitude of Lahore, has a winter temperature of 37·6° F.,with occasional frosts, while Lahore has a winter temperature of 54° F. Hongkong, in the latitude of Calcutta, has a winter temperature of 57° F., while that of Calcutta is 65° F. This makes the climate of China extreme for its latitude even near the sea.

Place.	Latitude.	Longitude.	Height in feet.	Coldest Month.	Hottest Month.	Mean Annual Rainfall.
Mukden .	41° 48′ N.	123° 23′ W.	197	7·5° F.	75·9° F.	24 in.
Peking . .	39° 57′ N.	116° 28′ W.	131	23·5° F.	78·8° F.	25 ,,
Wai-hai-wai	37° 24′ N.	121° 30′ W.	66	30·3° F.	76·5° F.	22 ,,
Shanghai .	31° 12′ N.	121° 26′ W.	33	37·6° F.	80·4° F.	44 ,,
Hankow .	30° 35′ N.	114° 17′ W.	—	38·8° F.	83·5° F.	54 ,,
Chingking .	29° 34′ N.	106° 54′ W.	853	47·3° F.	81·3° F.	42 ,,
Hongkong .	22° 15′ N.	114° 12′ W.	108	59·7° F.	81·7° F.	90 ,,

863. These figures show that the climate is extreme for the latitude, except in the south, and especially in Manchuria, which is on the northern margin of the monsoon belt. The cold outflowing winter winds counteract the influence of the sea. North of Shanghai the monsoon rains are rather scanty, but they are ample in the Yangtse basin and South China.

864. Rivers and Lowlands of China. The general course of the Chinese rivers has already been described

(§§ 666, 667), and the way in which they build up alluvial lowlands at their base (§§ 667, 810). The soil differs according to the rocks which compose the upper basin, but throughout the lowlands it is deep, fertile, and rich in plant foods. The Chinese rivers are long and rise high, and therefore vary greatly at different seasons, and are very liable to floods in the lowlands where their banks are low (§ 667). The Chinese pay great attention to irrigation, and use every kind of fertilizing matter to enrich their fields. They thus feed the densest population in the world.

865. Manchuria. Manchuria is a dry steppe in the west, but wetter in the east. The highlands are rich in gold, copper, and lead, and the eastern valleys are very fertile. Manchuria has been colonized by Chinese farmers, who grow giant millet, wheat, beans, rhubarb, and ginseng. Mukden, the capital, and Niuchwang, the port, are both in the Liao Valley, the chief route inland. The Siberian Railway (§§ 755, 6) crosses Manchuria to Vladivostok, the Russian Pacific port, and sends branches by Mukden to Niuchwang and Port Arthur (Japanese), and to Korea (§ 882).

866. North China. North China lies in the Hwang-ho basin. Trace the course of this river on the coloured map. It rises in Tibet, encloses the Ordos desert within its great bend, and descends from Mongolia to the plains which lie between the highlands of Shansi (West Mountains) and Shantung (East Mountains).

867. The most fertile part of its lower basin is covered with loess, a loose yellow soil carried by the winds from the sandy deserts of Mongolia. In the course of ages this has filled the valleys with a fertile loam thousands of feet deep, and left the mountain ranges as the rims of a number of basins or depressions. Each of these is more or less isolated, and has its fortress-capital, or county-town in the centre. The rivers have cut deep valleys down through the loose loess to the solid rock below, and flow between high vertical cliffs. The roads sink down in the same way and form artificial ravines. At first sight the whole country seems an uninhabited region of unfenced cultivated fields.

868. After leaving the loess region the Hwang-ho enters the alluvial plains round the Gulf of Chihli, into which it flows. As its current slackens it drops much sediment on to its own bed, which it has raised above the surrounding plains, and it is also silting up the shallow gulf. Its low banks are embanked, but these give way from to time, and after disastrous floods the river cuts out a new channel (§ 667).

869. **Peking,** the capital of China, lies not far from the base of the mountains which separate China from Mongolia. It is surrounded by walls, 60 feet high, with high towers and many gates. It consists of the Tatar city, the Chinese city, and the Forbidden City, formerly the residence of the court. The walls have been breached to admit the railway from Manchuria into the Tatar city, but much traffic is still done by caravans of camels and mules. Peking is connected by rail with Tientsin, its port, 60 miles distant, near the mouth of the Pei-ho. The line which connects it with Hankow, the great commercial city of the Yangtse, follows the base of the Shansi Highlands, crosses the Hwang-ho where it leaves them, climbs the Tsingling Mountains which separate the Hwang-ho from the Yangtse basin, and strikes the Han valley near its confluence with the Yangtse.

870. **North China** is a rich agricultural region with a great industrial future. Inexhaustible deposits of coal and iron are found together in the Shansi Highlands (3,000 feet), and many seams are 40 feet thick.

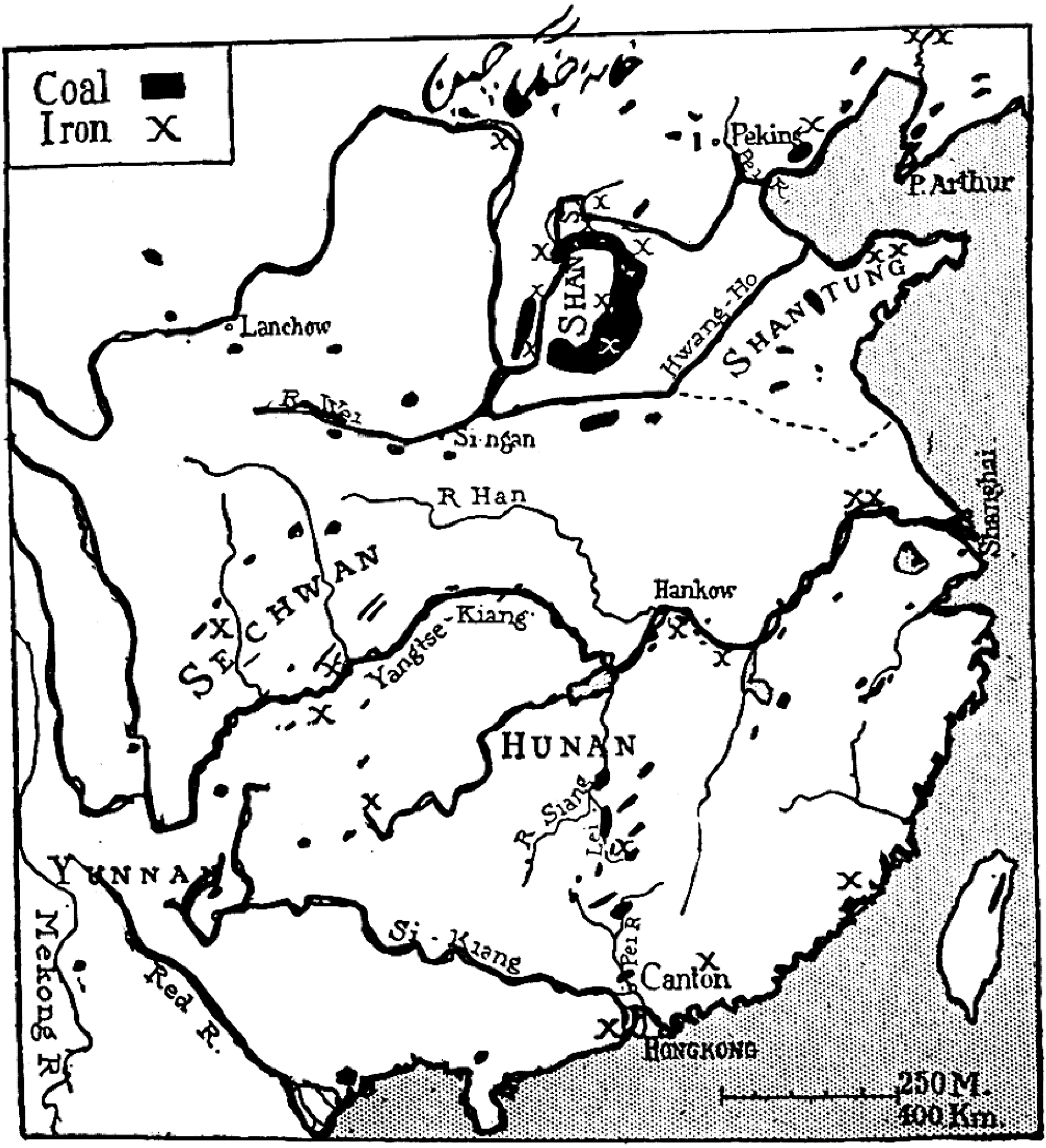


Fig. 29. Coal and Iron in China.

When railways are built this vast coalfield will not only supply the treeless plains of North China with cheap fuel, but also create a huge iron industry.

871. Middle China. The Yangtse rises in Tibet, is turned east by the Yunnan Highlands, and flows north-east across the mountainous province of Sechwan. The red sandstone soil of Sechwan is as fertile as the yellow loess of North China, and the climate is more genial. The rivers flow over harder rocks, and can be used to irrigate the plains and valleys. The plain of Chengtu (2,500 feet), irrigated from the Min tributary, is one of the most richly cultivated regions in the world. The hills of Sechwan are terraced to the summit, and with spade labour yield enormous harvests. Tea, opium, indigo, sugar, hemp, tobacco, drugs, rice, wheat, maize, pulses, and beans are grown at different heights. The rice-fields, which must be flooded, are separated by earthen walls, on which are planted mulberries for silk-worms. Opium is smoked to ease the pain caused by working on flooded land. Chungking, at the confluence of a tributary, is the river port and chief market of Sechwan. Below Chungking the Yangtse forms rapids as it descends in the gorges of the Sechwan Highlands, but again becomes navigable at Ichang.

872. The Lower Yangtse crosses broad alluvial lowlands which are old lake basins filled by river silt. Some lakes remain and regulate the flow of the river during the summer rains, when a rise of 70 feet is not uncommon. The towns and villages are built on natural or artificial heights above the level of the floods, which are raising the whole basin from two to three feet in a century. On the right bank the Yuan-kiang and the Sian-kiang flow to the main stream across the sandy flats of Lake Tungting from the highlands of Hunan, where hard anthracite coal and iron are found together. Lower down is the triple city Hankow-Hanyang-Wuchow, with a million people. Hankow (Hanmouth) is built where the Han enters from the Tsingling Mountains, forming an important route between north and south. It is the largest tea market in China and is reached by ocean steamers. The Lower Yangtse plains are covered with famous and densely peopled towns. Shanghai, the port of the Yangtse, is a great shipping and commercial centre.

873. Southern China. Southern China is a mountainous region, with many good harbours and a densely forested interior. Camphor and spices are among its forest produce, and mineral wealth is abundant. The mountains and dense forests make communication difficult, and primitive tribes live in the remoter parts. In the valleys opening to the main rivers the forests have been cleared and rice, tea, opium, cotton and other tropical Chinese crops are grown. It is from this region of forested highlands and small lowlands that most Chinese emigrants go. The population of the Si-kiang valley, the chief waterway of the country, is very dense, and rice is the staple crop on the broad valley bottoms. The port is Canton on the Si delta. The island of Hongkong, with Victoria as its capital, is British. On the coast north of the Si-kiang are Amoy and Fuchow.

874. Japan. Find Japan on the map. It consists of an archipelago of islands extending from the latitude of London to the tropic of Cancer, which crosses Formosa (13,500 square miles). The main islands are Hokkaido or Yezo (36,300 square miles), Honshiu or Hondo (87,500 square miles), Kiushiu (16,800 square miles), and Shikoku (7,000 square miles). Japan also includes the peninsula of Korea on the mainland (71,000 square miles). In Hokkaido the valleys radiate from a mountain centre (8,000 feet), and there are several active volcanoes. Hondo is crossed by a rift valley, with volcanoes along the margin. The highest are Fujisan, now dormant, the sacred mountain of Japan (12,400 feet); and Asamayama (8,200 feet), which is still active. The rivers rise high and have short rapid courses, and are often flooded by the summer monsoon rains. The Inland Sea separates Hondo from Shikoku and Kiushiu, and all the most fertile lowlands of Japan open to it.

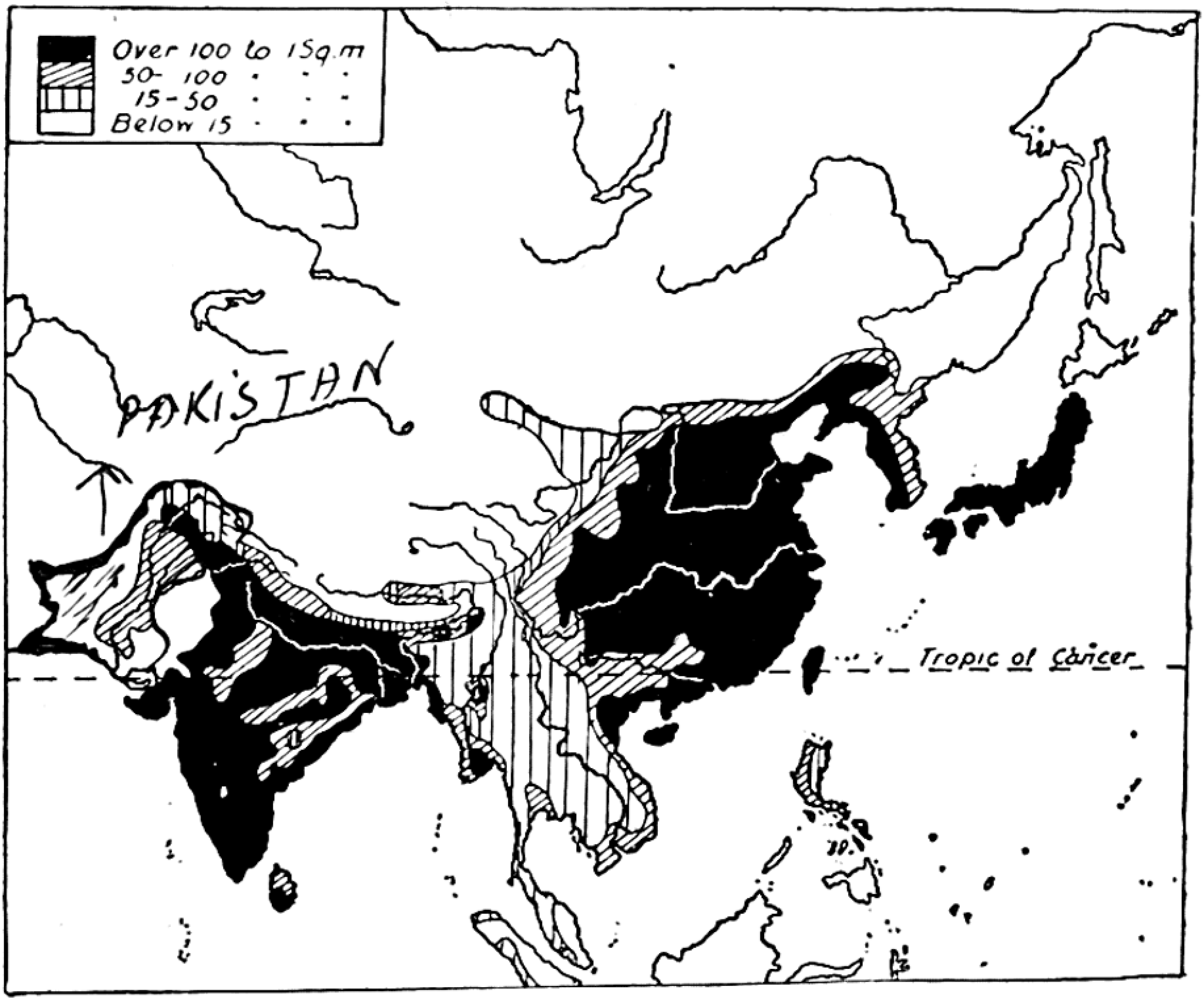


Fig. 30. Density of Population in the Monsoon Lands.

875. Climate. The following figures show that Japan has an extreme climate in spite of its insular position. The cold north-west winds of the continent make its winter cold. It has rain at all seasons, but most in summer, except on the west coast.

Place.	Latitude.	Longitude.	Height in feet.	Coldest Month.	Hottest Month.	Mean Average Rainfall.
Hakodate	41° 16′ N.	140° 44′ W.	16	26·8° F.	70·1° F.	45·4 in.
Tokyo .	35° 41′ N.	139° 45′ W.	66	37·2° F.	77·7° F.	57·9 ,,
Nagasaki.	30° 44′ N.	129° 52′ W.	443	42·4° F.	80·3° F.	74·3 ,,

876. Occupations and Products. Agriculture is the chief occupation of Japan, which feeds an enormous population. The area of Japan proper is under 150,000 square miles, and two-thirds are mountain and forest. The lowlands are small and lie round the coasts or the lower courses of the rivers. The soil is not very fertile, except where it is formed from weathered volcanic rocks. On the other hand, warm moist breezes blow from the Kuro Siwo, the warm Japanese current, the summer monsoons bring abundant rains to the mountain slopes, and the lowlands are covered with a network of streams. Rice is grown wherever the paddy fields can be irrigated, and there are said to be 4,000 different varieties suited to different soils, heights, moisture, &c. Above 2,500 feet are the huts of charcoal burners, or of summer fishermen in the lakes, but few farms. After rice, tea, introduced from China a thousand years ago, and mulberries for feeding silk-worms are the chief crops. The mulberry trees are kept closely picked, and do not shade the other crops too much. Broods of silk-worms are raised in spring and autumn, and sometimes in summer too. They are tended by the women and children, and the reeling is done when farm work is impossible.

877. Japanese agriculture involves unremitting toil, for the farms are small, and the heavy work is not done by animals, as with us. The soil has to be deeply dug, carefully weeded in the wet season when weeds grow as fast as plants, and constantly watered and manured.

Every kind of manure, including fish refuse, is used. To economize space, crops which ripen in succession are planted together in alternate rows. Barley and beans are often grown together, and beans are mixed with carrots, maize, millet, and giant radishes. The barley ripens first, is cut and harvested by hand, and hung to dry on the branches of the mulberries and under the eaves of the farm-houses. Here again space is economized, for in England grain is allowed to stand and dry on the fallow fields. Indigo, cotton, hemp, flax, and tobacco are also grown, and after the rice harvest wheat, barley, or rape seeds are planted as winter crops in the wet fields.

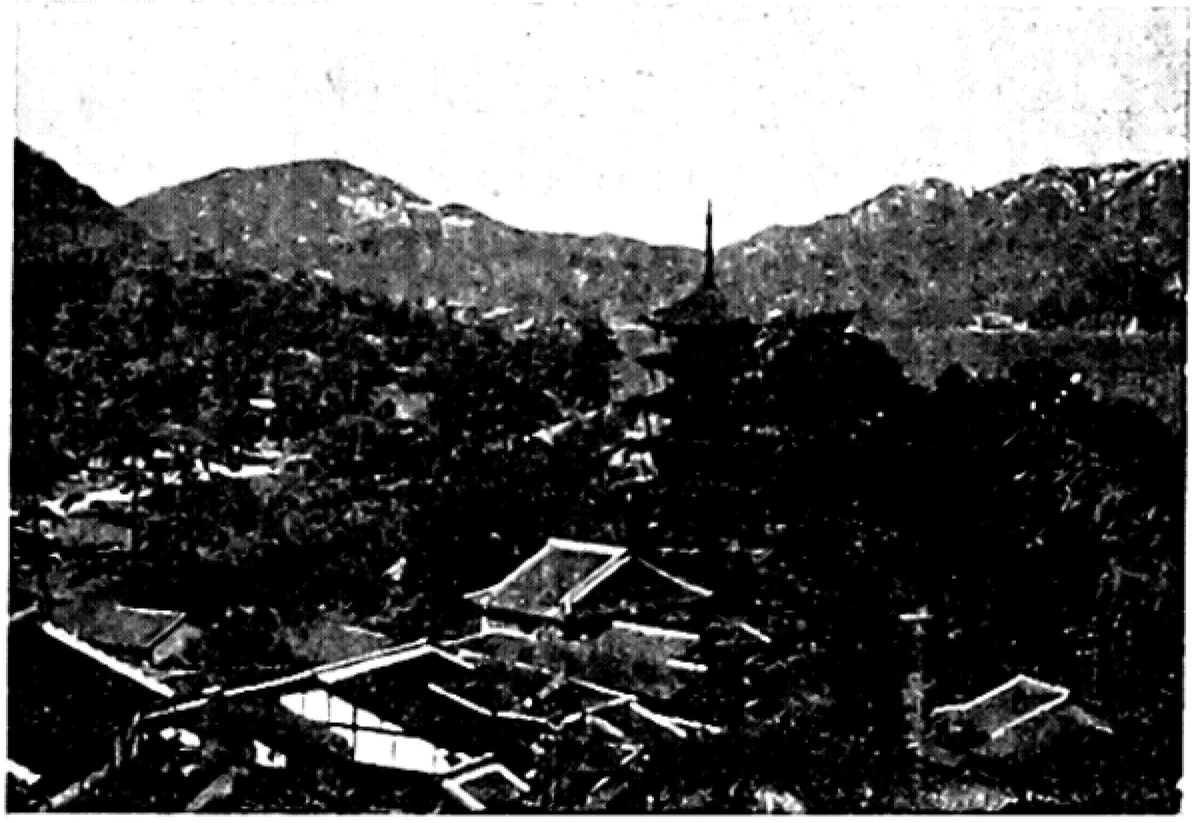


Fig. 31. A Japanese Landscape.

878. Fishing is an important occupation along the coasts. Japan has a long coast-line, extending through many degrees of latitude, and many species are caught.

879. Japan has important mineral resources. Coal and iron are found, but not together as in China. The largest coalfields are in Hokkaido and Kiushiu. China clay, a decomposed granite (§ 382), is made into exquisite porcelain, and beautifully decorated. Lacquer, embroidery, and other arts have long been practised.

880. In the middle of last century a great change came over Japan, which adopted western methods of education and manufacture. Huge cotton mills and steel-works have grown up, chiefly at Kobe and Ozaka in Hondo. Japan has become a great military and naval power, and has begun to colonize the opposite mainland.

881. Towns. There are three densely peopled areas: (i) round Tokyo, the modern capital, on Hondo, with Yokohama as its port; (ii) along the shores of the Inland Sea, round the manufacturing towns of Kobe and Ozaka; and (iii) in Western Kiushiu, round Nagasaki, the port.

882. Korea. Korea, conquered in 1905, is a mountainous peninsula with lowland opening to the Yellow Sea. It has an extreme climate and summer monsoon rains. The mountains are forested, and wheat and giant millet and ginseng are grown in the north. The southern valleys are colonized by Japanese farmers, who grow all Japanese crops. Korea is rich in gold and probably in other minerals. A line runs from Fusan, the port on the Pacific opposite Japan, by Seoul the capital, and Chemulpho the port on the Yellow Sea, into Manchuria, where it connects with the Siberian lines.

883. Formosa. Formosa is a mountainous island (14,000 feet), covered with dense forests inhabited by uncivilized tribes. Camphor is the chief forest product. The lowlands are cultivated with the same crops as the warmer parts of Japan and China.

884. Indo-China. The coloured map shows the direction of the mountain ranges and rivers, and the position of the lowlands. An eastern line of heights runs south through Annam, and is separated by the

Mekong gorge from the central ranges, which form the core of the Malay Peninsula. West of these is the Salwin gorge, which is separated from Burma by more mountains. The densely forested upper valleys of the rivers form the Shan States, and are the home of wild hunting tribes. The mountains receive heavy rains, and the long rivers bring down much sediment which has built up great deltas, and much water which floods them in the wet seasons. These deltaic lowlands are separated by high forested mountains, and are under divided political control. The Red River delta forms the French colony of Tongking (capital, Hanoi). Annam (capital, Hue), and Cochin China and Cambodia in the Menam delta (capital, Saigon) are also French. The total area of French Indo-China is about 250,000 square miles. The native kingdom of Siam (195,000 square miles), in the Menam delta, is still independent. Its capital is Bangkok, a city of many waterways, pile dwellings, palaces, and fine Buddhist temples.

885. Climate. These lands have a monsoon climate which passes into an equatorial climate in the south.

Place.	Latitude.	Longitude.	Height in feet.	Coldest Month.	Hottest Month.	Mean Annual Rainfall.
Hanoi . .	21° 2′ N.	130° 30′ W.	53	64·0° F.	83·6° F.	67·5 in.
Hue . . .	16° 33′ N.	107° 38′ W.	23	67·5° F.	85·1° F.	102 ,,
Manila . .	14° 35′ N.	120° 58′ W.	46	77° F.	83·5° F.	75·9 ,,
Bangkok .	13° 38′ N.	100° 27′ W.	—	76·1° F.	83·5° F.	58·6 ,,
Sandakun . (N. Borneo)	6° N.	118° W.	98	81·9° F.	81·9° F.	127 ,,
Singapore .	1° 17′ N.	103° 51′ W.	10	78·3° F.	81·5° F.	92·8 ,,

Notice that there is little difference between the heat of summer and winter, and that the rainfall is heavy, especially on exposed coasts and in low latitudes.

886. All through this region the forested highlands are rich in valuable plants and precious stones, but have been little explored. Rubber grows wild, and is being increasingly cultivated on cleared plantations. Rice is grown in the flooded lands, and fishing is important in the deltas, lakes, and along the coasts.

887. The Malay Peninsula. Britain holds the southern part of this peninsula, which stretches almost to the equator. The protected territory is known as the Federated Malay States. The British colony forms the Strait Settlements (1,500 square miles). The mountains (8,000 feet) are covered with dense tropical forests and supply half the tin used in the world. These forests and jungles are the refuge of the elephant, tiger, monkey, and other wild animals, and of uncivilized hunting tribes who use stone weapons and live on forest produce. Clearings are being made for rubber, spice, pepper, tapioca, coffee, and rice plantations.

888. Singapore, in the extreme south of the peninsula, is British. It commands one of the most important sea routes in the world, leading from the Indian Ocean by the Malacca Strait to the Far East and Australia. It is a coaling station with a fine harbour, strong fortifications, and dockyards.

889. The East Indies. Java (50,500 square miles), Sumatra (162,000 square miles), Borneo (213,000 square miles), Celebes (71,500 square miles), and the Molucca or Spice Islands (44,000 square miles), are Dutch, with the exception of part of Borneo (86,000 square miles), which is British. The Philippine Islands (128,000 square miles) belong to the United States. There are innumerable smaller islands, separated by many straits. All these islands are mountainous, and many are volcanic. They are either in or on the margin of the equatorial belt, and produce all equatorial plants. The forests yield rubber, spices, &c., and are the home of very primitive tribes. More civilized tribes in the lowlands grow the sago palm. The Philippines produce Manila hemp, and fine tobacco, which is made into Manila cigars.

890. Intercourse is easier by water than by land, for the islands are crossed by many rivers, and the lowlands open to seas where the winds blow very regularly. Trade, piracy, and migration have always been important, and have led to much intermixture of race. The two entrances into this East Indian Mediterranean are (i) by Malacca Strait, controlled by Singapore and by (ii) the Sunda Strait, controlled by Batavia (Dutch) in Java. Manila, on Luzon, the most important of the Philippines, is the centre of sea routes

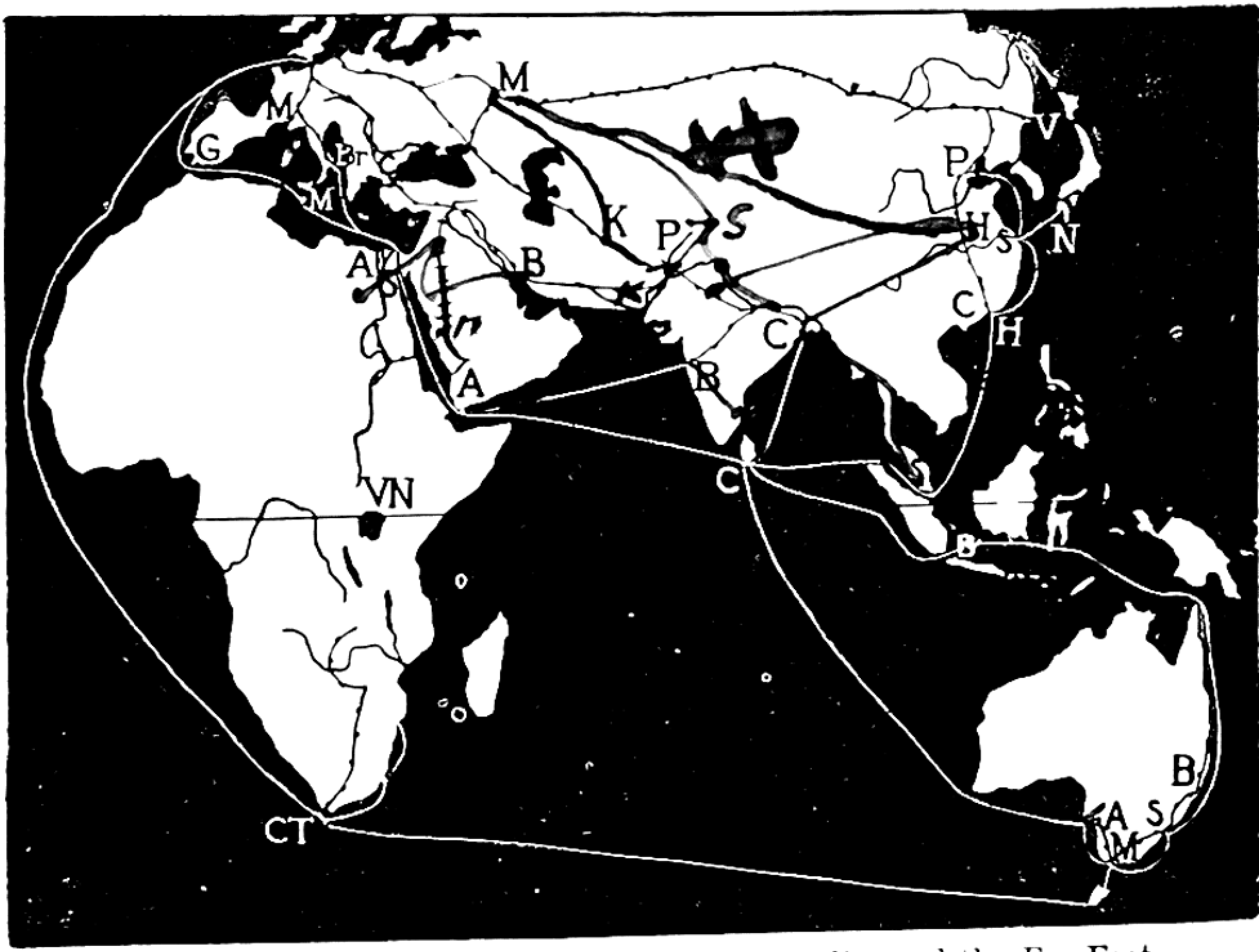


Fig. 32. Commercial Routes to India, Australia, and the Far East.

from Hongkong, Tongking, Singapore, Batavia, Australia, the Pacific Islands, and the Pacific coast of America.

891. Java. Java shows how rich these islands will become. It has a fertile volcanic soil, in which every tropical and temperate crop can be grown at suitable heights. Coffee and chinchona are the most important, but spices, sugar, coco-nut, rubber, cereals, and cotton are also cultivated. The capital is Batavia, and on the heights above is one of the finest botanical gardens in the world.

892. British North Borneo. Rubber is the most valuable product, but tobacco, coffee, pepper, and spice plantations are being formed. In all these islands the hot moist climate does not suit Europeans, who merely oversee the work of Chinese or Malay coolies or labourers.

892a. Sarawak is an independent State forming the private property of a British ruler. It is rich in forest produce, gold, diamonds, and coal. Brunei, under British protection, is a small native State between Sarawak and British North Borneo.

Exercises

1. Draw a map of China, marking the chief rivers and towns.
2. Describe the natural advantages possessed by North and Middle China respectively.
3. Explain fully how the monsoon lands support so dense a population. What are the chief agricultural products?
4. Japan has been called the Britain of the Far East. How far is this comparison true?
5. On a map of Eastern Asia mark Batavia, Hongkong, Nagasaki, Singapore, and Yokohama. State what geographical causes make each important.
6. In what parts of Asia are cotton, rice, rubber, silk, tea, and teak chiefly produced, and why? Illustrate by sketch maps for each.

INDEX TO PART IV

(The references are to the pages)

Afghanistan, 69.
Agra, 98.
Aleppo, 62.
Allahabad, 98, 100.
Amu R. (Darya), 12, 65.
Amur R., 13, 14, 47.
Annam, 166.
Arabia, 19.
Armenian Highlands, 6, 8, 55-6.
Arabia, 72-3.
Asia, area of, 1-2; coast-line of, 2-3; relief of, 3-19; climate of, 20-29; vegetation of, 31-41; cultivated plants of, 39-41; domesticated animals of, 41-2; occupations of, 42; peoples of, 43-4; political divisions of, 43-4; regional geography of, 45-119.
Asia Minor, 7, 57-9.
Assam, 99.

Baghdad, 62-3.
Baikal L., 47.
Baku, 56.
Bangkok, 116.
Benares, 98.
Bokhara, 66-8.
Bombay, 100-1.
Borneo, 117; (British), 119.
Brahmaputra R., 12, 13.
Burma, 102-3.

Calcutta, 25, 98, 101.
Cambodia, 116.
Canton, 111.
Caucasus Mts., 8, 53-4.
Celebes, 117.
Ceylon, 102.
China, 104-111; North, 107-9; Middle, 110; Southern, 111.
Chungking, 110.
Climate statistics 23, 48-9, 64, 85, 87, 88, 93, 106, 113, 116.
Colombo, 102.
Cotton, 66-7, 115.
Cultivated plants of Asia, 39-41; India, 89.

Damascus, 61.
Deccan, 19, 99-102.
Delhi, 96, 98.
Deserts of Asia, 11, 38, 64-73.

East Indies, 117-19.
Elburz Mts., 8, 10, 53, 71.
Erzerum, 60.
Euphrates R., 12, 60, 62
Everest, Mt., 75.

Far East, The, 104-119.
Floods, 48; work of, 13, 14.
Forests of Asia (taiga), 32-5.
Formosa, 115.
Fujisan Mt., 9, 112.

Ganges R., 12, 13, 75, 96-9.
Ghats, The, 19, 99-102.
Gobi, Desert of, 11, 69.
Godaveri R., 99.

Haidarabad, 101.
Hankow, 24, 108, 110-11.
Herat, 70.
Himalaya Mts., 8, 10-11, 74-82.
Hindu Kush Mts., 8.
Hondo (Honshiu), 111.
Hongkong, 106.
Hwang-ho, 104, 107, 108; (river), 13, 14, 18.

India, 82-103.
Indo-China, 115.
Indus R., 12, 13, 75, 96.
Iran, 6, 7, 8, 69-72.
Irawadi R., 13, 103.
Irkutsk, 24, 47, 52.
Irrigation, 39, 49, 59, 61, 62, 66, 67, 68, 70, 71, 72, 80, 89, 93-5, 96, 98, 103, 107, 116.
Ispahan, 71.

Java, 117-119.
Jerusalem, 61.
Jumna R., 96, 98.

Kabul, 69.
Karakoram Mts., 77.
Karachi, 90.
Kashgar, 68.
Kashmir, 79-80.
Kauveri R., 99.
Khaibar Pass, 70, 77, 95.
Korea, 111, 115
Kurdistan, 60.
Kwen Lun Mts., 8, 68, 74.

Lahore, 95.
Lebanon Mts., 60, 61, 62.
Lena R., 12, 47.
Leontes R., 60.
Lhasa, 80.
Lucknow, 98.
Madras, 101.
Malay Peninsula, 117.
Manchuria, 9, 107.
Mandalay, 103.
Mecca, 73.
Medina, 73.
Mekong R., 13, 116.
Menam R., 13.
Mesopotamia, 18, 62.
Mid-World Mountains, 6.
Molucca Is., 117.
Mongolia, 9, 68-9.
Monsoon winds, 28-9.
Moulmein, 103.
Mountains of Asia, 6-11.
Mukden, 52, 107.
Multan, 95.
Mysore, 101.

Nagasaki, 115.
Narbada R., 19, 99, 100.
Near East, the, 53-63.
Nilgiri Hills, 19, 100.

Oases, 66-7, 68, 72, 73.
Ob R., 12, 46.
Occupations, 42, 49, 50, 55-6, 59, 71, 72, 77-9, 91-2, 109.
Omsk, 46, 50.
Opium, 110, 111.
Orontes R., 60.
Oxus R., 12, 74.
Palestine, 60-2.
Pamirs, the, 6, 18, 69, 74.
Peking, 24, 108
Persia, 71-2.
Philippine Is., 117, 118.
Pontic Mts., 7, 58, 59.
Port Arthur, 107.
Punjab, 8, 93-5.

Rajputana, 95-6.
Rangoon, 103.
Red River of Tongking, 13, 116.
Rice, 40, 90, 98, 101, 102, 103, 107, 109, 110, 111, 113, 114, 116.
Rift valleys, 17, 60.
Rivers, constructive work of, 12; of Asia, 11-15; working, 76; work of, 116.
Rubber, 34, 102, 117, 119.

Salwen R., 13, 116.
Samarkand, 24, 66, 67, 68.
Shanghai, 111.
Shantung, 106.
Si River (Kiang), 104, 106, 111.
Siam, 116.
Siberia, 9, 17, 24, 45-52.
Siberian Railway, 50, 107.
Silk, 59, 66, 71; -worm, 110, 113.
Sind, 95-6, 100.
Singapore, 117, 118.
Smyrna, 59.
Steppe life, 36.
Steppes, 35-8; wheat-growing in, 39, 40, 49.
Suleiman Mts., 8.
Sumatra, 117.
Surat, 100.
Sutlej R., 75, 93.
Syria, 60-2.

Tapti R., 19, 99, 100.
Tarim basin, 8, 11, 68.
Tashkend, 68.
Taurus Mts., 7, 8, 57.
Teheran, 71, 72.
Tian Shan Mts., 8, 68, 74.
Tibet, 7, 11, 18, 80.
Tiflis, 53, 56.
Tigris R., 12, 60, 62.
Tobolsk, 24, 46.
Tokyo, 115.
Tongking, 116.
Trans-Baikalian Highlands, 9.
Trans-Caspian Railway, 67, 68.
Tropical forests, 34-5.
Tundra (Asia), 31-2.
Turan, 17-18, 65-8.
Turkestan, Chinese, 68; sian, 65-8.
Turkey in Asia, 57-63.

Ural Mts., 46.

Verkoyansk, 24.
Vladivostok, 47, 52.

Yangtse, 104, 105, 106, 108, 110, 111; (Kiang), 13, 14, 18.
Yarkand, 68.
Yenisei R., 12, 46, 47.
Yokohama, 115.

PART V

AFRICA

CHAPTER I

Use the globe, the coloured maps in this book, and the Oxford Wall Maps of Africa

THE RELIEF OF AFRICA

893. Size and Position. Africa is the second largest of the continents, with an area of 11,500,000 square miles, or three times that of Europe. It is an immense peninsula, united to Eurasia only by the narrow isthmus of Suez (80 miles), and stretching from lat. 37°N. to lat. 34°S. It is crossed near the middle by the equator, but owing to the shape of the continent most of the land is in the northern hemisphere.

894. The northern shores are washed by the Mediterranean Sea, the west and south by the Atlantic Ocean, and the east by the Indian Ocean and the Red Sea. A ship canal has been cut across the isthmus of Suez, and forms a direct route from the Mediterranean Sea to the Red Sea and Indian Ocean.

895. The Mediterranean Sea and the Red Sea are both nearly land-locked, and at two points the coast of Africa is within a few miles of that of Europe and Asia: (i) at the Strait of Gibraltar (9 miles), between Northern Africa and Spain, leading from the Atlantic Ocean to the Mediterranean Sea; and (ii) at the Strait of Bab-el-Mandeb (14 miles), between East Africa and Arabia, leading from the Red Sea to the Indian Ocean. The physical features of Spain and Arabia are continued across these straits into Africa.

896. Unlike Eurasia, which is cut into many peninsulas, islands, inland seas, and gulfs, Africa is very compact in shape. Its coastline is therefore small. Europe has 20,000 miles of coast, but Africa, though three times as large, has only 16,000 miles. The only large

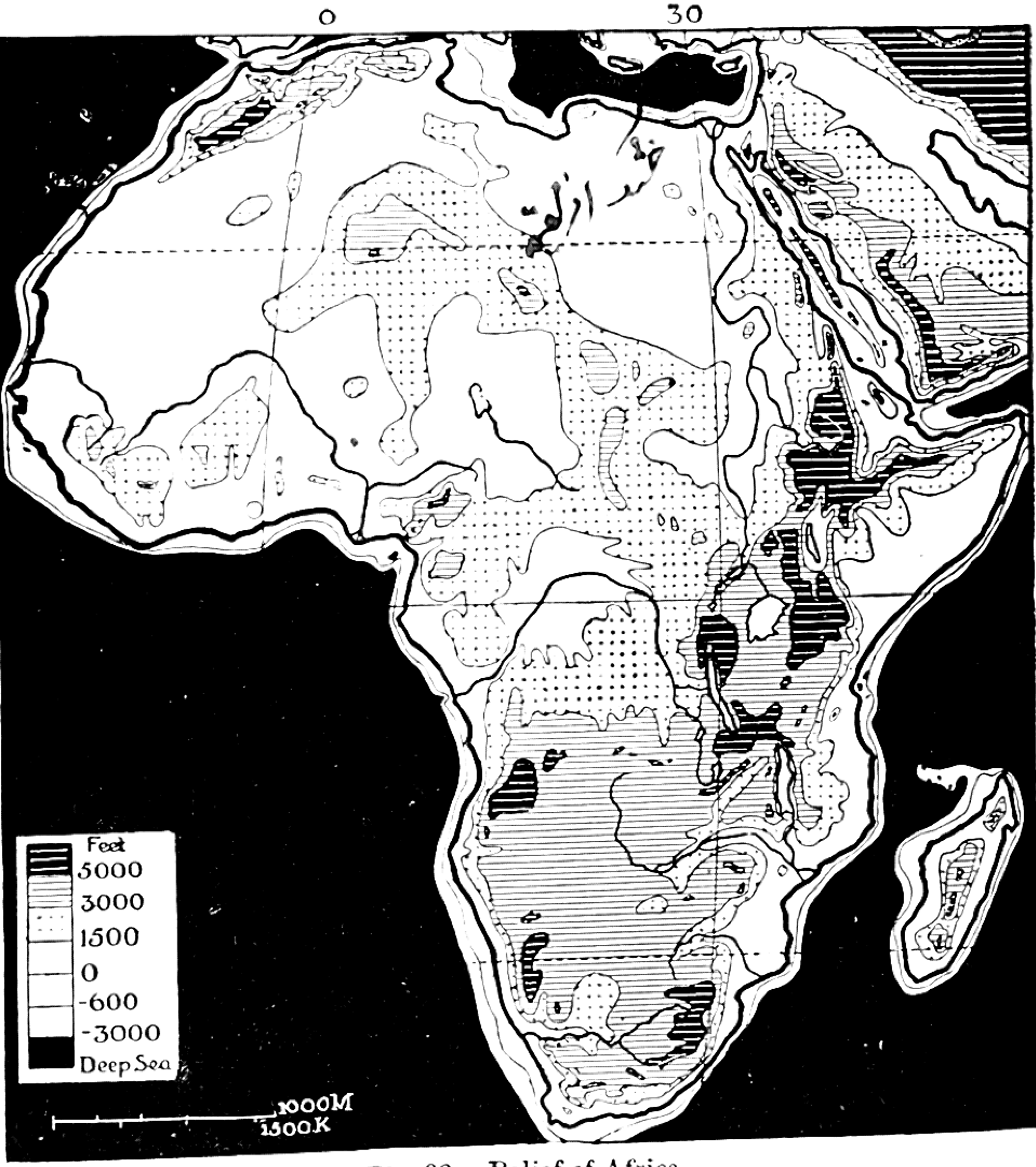


Fig. 33. Relief of Africa.

island is Madagascar, separated from the mainland by the Mozambique Channel. On the north coast there is one large gulf, the Gulf of Tripoli, and on the west, almost in lat. 4° N., the continent narrows to half its width, forming the Gulf of Guinea.

897. Africa is nearly 5,000 miles long from north to south, and north of the Gulf of Guinea it is over 4,500 miles broad from east to west. In Fig. 331, which shows the distance from the sea, each circle is 2,000 miles in diameter.

898. General Relief of Africa. In the coloured map the contour lines are drawn for 600 feet, 3,000 feet, and 10,000 feet. The 600 feet contour line is almost everywhere close to the coast, and hardly any land is under that height. All the coloured land is over 600 feet and the solid brown land is over 3,000 feet high. A broad belt along the Western Mediterranean, running parallel to the coast and reaching the sea at Cape Bon opposite the island of Sicily, represents the Atlas, a continuation of the mountains of Spain (§ 485), and part of the Mid-World Mountains (§ 650). A broken line of low ground, under 600 feet high, south of the Atlas, represents the region of the shotts, low salt lakes, which cross the Sahara Desert of Northern Africa. The brown land is broadest and most continuous in East and South Africa. The land over 10,000 feet, shown in the darkest brown, is only found in the extreme east. This map shows that Africa consists of two regions of very uniform height: (i) North Africa, under 3,000 feet high, except in the Atlas Mountains and the heights which cross the Sahara; and (ii) East and South Africa, generally over 3,000 feet high.

899. Fig. 33 shows the depth of the seas as well as the height of the land. The contour lines are drawn for 600 and 3,000 feet below sea-level, and for 1,500.

3,000, and 6,000 feet above. Both the submarine contour lines follow the coast closely, showing that the continental shelf is narrow and that Africa rises out of deep seas.

900. Compare the position of the contour line of 1,500 feet with that of 600 feet in the coloured map, and notice how little they differ. This shows that the land rises steeply from 600 to 1,500 feet, and that most of Africa is above that height. The 3,000 feet contour line is given in both maps, for it is important both for structure and climate. The contour line for 6,000 feet is taken instead of that for 10,000 feet, but includes only a small fraction of the continent. A comparison of the two maps makes it still more clear that Africa rises steeply from deep seas, and is uniform in height over great areas.

901. Africa consists of three different belts:

(i) The Atlas region in the north, continuous with Europe and the Mid-World Mountains;

(ii) A depression, partly filled by salt lakes, and partly covered with deposits from the higher ground; and

(iii) The high African plateaus continuous with those of Arabia and the Deccan (§ 674).

902. The African Tableland or Plateau. The African tableland or plateau consists of old rocks of many kinds lying almost level, which were raised above the sea early in the Earth's history and have never been submerged since. The more recent rocks are all land deposits.

903. The African plateau is highest in the east and reaches 12,000 feet in Natal. This high edge falls as a series of terraces with steep seaward scarps to the coastal plains, which are broadest where rivers cross them. Except in Natal, most of the highest summits are active or extinct volcanoes.

903a. The surface rocks of the African tableland are older than those of Northern Africa, which has risen more recently above the sea.

904. The African tableland was once continuous with the tablelands of Arabia, the Deccan, and Australia, and a continent formerly existed where the present Indian Ocean now is. Vast areas of this old continent sank down, forming the present seas and oceans and leaving the tablelands as high upstanding masses of hard rock.

905. The Rift Valleys. The rift valleys are a striking feature of the geography of Africa. A glance at the coloured map shows that the lakes of Africa differ greatly in shape. Some (e.g. Lake Victoria 29,000 square miles, Lake Chad, Lake Bangweolo) are round or square, are often shallow, and have low shores. In the drier parts of South Africa the water often evaporates, leaving shallow deposits of brine, filling depressions in the deserts which are called salt-pans. The other group of lakes are long and narrow, and not unlike the Red Sea in shape. They lie in deep rifts far below the general level of the plateau, which shuts them in as high escarpments. Find on the map Lake Tanganyika (14,000 square miles, 400 miles long), which is twice as large as Wales, and compare its shape with that of Lake Nyasa (350 miles long), Lake Albert, &c.

906. The Red Sea, a continuation of the rift valley of Western Asia (§§ 775–7), is continued across East Africa by a rift valley which converges in the south with a more western rift. The floors of these rifts are covered with deposits from the plateau above, and the deepest parts are filled by lakes. The western rift contains Lakes Albert and Edward, drained to the Nile, and Tanganyika, drained to the Congo, as well as many smaller ones. In the eastern rifts are Lake Rudolf (190 miles long) and Lake Nyasa, drained to the Zambezi.

907. Volcanoes of Africa. Volcanoes are found near the rift valleys, and were probably active when these were formed. Kilimanjaro (19,000 feet) and Kenya (17,000 feet), both extinct, rise above the eastern rift. The Mfumbiro group near Lake Kivu in the western rift, and the Abyssinian Highlands west of the Red Sea (15,000 feet), are also volcanic.

908. On the west coast, where the African coast curves abruptly south, is the volcanic Kamerun peak (13,000 feet). Many of the islands off the west coast are also volcanic.

909. The Atlas Region. The present Atlas ranges were formed in the same period as the Alps and Himalayas, but an older range of mountains had existed there still earlier. The earth movements which raised the Mid-World Mountains threw this worn-down region into a new series of upfolds and downfolds, and formed the present ranges of the Atlas. These are now being denuded, and this exposes rocks of many different ages.

910. The Atlas Mountains are connected with the Sierra Nevada of Southern Spain. The Strait of Gibraltar, between the two, was formed in comparatively recent times. The Atlas is part of a continuous rim of mountains which once enclosed the western basin of the Mediterranean. This was broken by the sinking down of the Mediterranean Sea, but is represented by a submarine ridge connecting Cape Bon and Sicily, by the mountains of Sicily, and by the Apennines.

911. The Rivers of Africa. The longest rivers of Africa are the Nile (4,000 miles), the Niger (2,600 miles), the Congo (3,500 miles), and the Zambezi (2,000 miles). Only the Niger rises north of the equator. The Nile, Congo, and Zambezi rise south of the equator, in the highest part of the plateau; and the divides between them are so low that in the wettest months vast flooded lakes and swamps are drained to all.

912. River Floods. All the African rivers flow through tropical lands which have a well-marked wet and dry season (§§ 923–5), and their volume varies greatly. The Congo varies least, for its basin is in equatorial latitudes where rain falls at all seasons. Tributaries which rise between the equator and the Tropic of Cancer are in flood during the northern summer, and those which rise between the equator and the Tropic of Capricorn carry most water in the southern summer (§ 923). The Nile varies most, and its annual floods long puzzled geographers. In the drier parts of Africa the river beds contain little water except after rain. Many rivers do not reach the sea, but form basins of inland drainage. Lake Chad is in such a basin.

which
of Vi
Nil

913. In Asia river floods have built up great alluvial lowlands opening to the sea, but these are not found in Africa, where the coastal plains are narrow. The Upper Congo basin and the Nile valley are deeply covered with alluvial soil, and the Nile, Niger, and Zambezi have built up great deltas.

Exercises

1. Point out the most important differences between the relief of Africa and the relief of Europe.
2. What is a rift valley? Describe those of Africa. Where else are they found?
3. What differences would you expect to find between the climate of (*a*) North Africa and South Africa, and (*b*) of Africa and Asia?
4. What is the cause of river floods? What is the importance of these to man?
5. Explain the terms, *basin of inland drainage*, *alluvial lowland*, *delta*, *shott*. Give an example of each in Africa, and say briefly how each is caused.

غلام مرتضےٰ سید

کلاس ع۔ ۱۰(ا)

1932

جواہر لعل کی دوانچ

جو ہند کا لیڈر ہے۔

CHAPTER II

THE CLIMATE OF AFRICA

914. The greater part of Africa lies between the tropics, and the rest is in warm temperate latitudes. The climate must therefore be different in many ways from that of Asia, and still more different from that of Europe.

915. The figures given in the table below show the distribution of temperature and rainfall.

Station.	Latitude.	Longitude.	Height in feet.	Coldest Month.	Hottest Month	Mean annual rainfall.
Cape Spartel . .	35° 47′ N.	5° 55′ W.	—	54·1° F. (Jan.)	73·7° F. (Aug.)	30 in.
Algiers	36° 47′ N.	3° 4′ E.	125	54·0° F. (Jan.)	78·1° F. (Aug.)	27 „
Biskra (Sahara) .	34° 5′ N.	5° 40′ E.	446	52.0° F. (Jan.)	90·0° F. (July)	8 „
Alexandria . . .	31° 12′ N.	29° 54′ E.	105	57.9° F. (Jan.)	80·4° F. (Aug.)	8·5 „
Cairo	30° 5′ N.	31° 17′ E.	98	54 1° F. (Jan.)	83·5° F. (July)	1·4 „
Aswan	24° 2′ N.	32° 53′ E.	325	61·7° F. (Jan.)	92·3° F. (July)	0 „
Khartum	15° 37′ N.	32° 33′ E.	1,247	69·1° F. (Jan.)	91·6° F. (May June)	4·2 „
Timbuktu	16° 49′ N.	2° 52′ E.	820	70·5° F. (Dec.)	93·7° F. (June)	8·6 „
Bathurst	13° 27′ N.	16° 34′ E.	—	83·4° F. (May)	88·2° F. (Oct.)	46·4 in.
Zungern	9° 49′ N.	6° 17′ E.	530	77·3° F. (Aug.)	86·9° F. (Mar.)	44·6 „
Lagos	6° 27′ N.	3° 24′ E.	—	74·7° F. (Aug.)	81·0° F. (Feb.)	75·5 „
Entebbe	0° 3′ S.	32 30′ E.	3,906	70 8° F. (Aug.)	72·7° F. (Jan)	59·1 „
Axim	4° 52′ N.	2° 15′ E.	—	76·1° F. (July)	82·4° F. (Mar.)	52·2 „
Bolobo	2 10′ S.	16° 13′ E.	1,080	78·1° F. (Dec.)	80·3° F. (Mar.)	62·8 „
Leopoldville . . .	4° 19′ S.	15° 19′ E.	1,115	78·5° F. (July)	79·6° F. (Sept.)	55·6 „
Mombasa	4° 4′ S.	39° 42′ E.	60	77·5° F. (July)	82·9° F. (Jan.)	48·0 „
Zomba	5° 23′ S.	30° 18′ E.	2,948	61·6° F. (July)	75·0° F. (Nov.)	54·4 „
Salisbury	17° 48′ S.	31° 5′ E.	4,880	56·3° F. (July)	69·3° F. (Jan.)	34·4 in.
Johannesburg . .	26° 12′ S.	28° 3′ E.	5,735	47·4° F. (July)	70·3° F. (Dec.)	30·4 „
Kimberley . . .	28° 43′ S.	24° 46′ E.	4,042	51·4° F. (June)	77·9° F. (Dec.)	18·2 „
{ Durban	29° 53′ S.	31° 4′ E.	—	64·2° F. (Aug.)	76·6° F. (Jan.)	42·2 „
{ Pietermaritzburg	29° 34′ S.	30° 22′ E.	2,225	57·1° F. (July)	73·5° F. (Jan.)	31·6 „
East London . .	33° 2′ S.	27° 55′ E.	30	58·1° F. (July)	69·6° F. (Feb.)	23·5 „
Cape Town . . .	33° 56′ S.	18° 29′ E.	40	54·0° F. (July)	69·3° F. (Jan.)	24·0 „
Walvisch Bay . .	22° 57′ S.	14° 26′ E.	7	54·1° F. (Aug.)	63·3° F. (Jan.)	0·3 in.

916. These figures are worth examination. Cape Spartel, which is nearer the Atlantic than Algiers, has a more equable climate and a heavier rainfall. Algiers has a much less extreme climate than Biskra, on the northern edge of the Sahara, and more than three times as much rain. The same difference, in a more marked degree, is seen by comparing the temperature and rainfall of Alexandria and Cairo, in the Nile Valley. Khartum, on the southern margin of the desert, has an extreme climate for its latitude, and a rainfall of over 4 inches. Compare its figures with those given for Timbuktu, on the southern margin of the desert in West Africa.

917. The next group of places is within 15 degrees of the equator on either side of it. The land is broader north of the equator than south of it, and this affects the winds, the temperature, and the rainfall. Notice that the hottest month varies with position north and south of the equator, and that no place in this group is so hot as Khartum in summer. The heat is nevertheless much more oppressive, for the air is very damp, while the desert air is dry and bracing. The reason for the lower temperature in the tropical belt is given in § 924. Notice also the differences between places in East and West Africa in almost the same latitudes.

918. Walvisch Bay, almost on the tropic of Capricorn, shows that there is a rainless area in the west of South Africa corresponding to that in North Africa.

919. The last group of figures shows the climate of South Africa. The figures should be compared with those in the first group for places in similar latitudes in the northern hemisphere. Most of South Africa lies in the latitudes of the Sahara, but the shape of the continent is so different that though dry in many parts it has an ample rainfall wherever the land is high

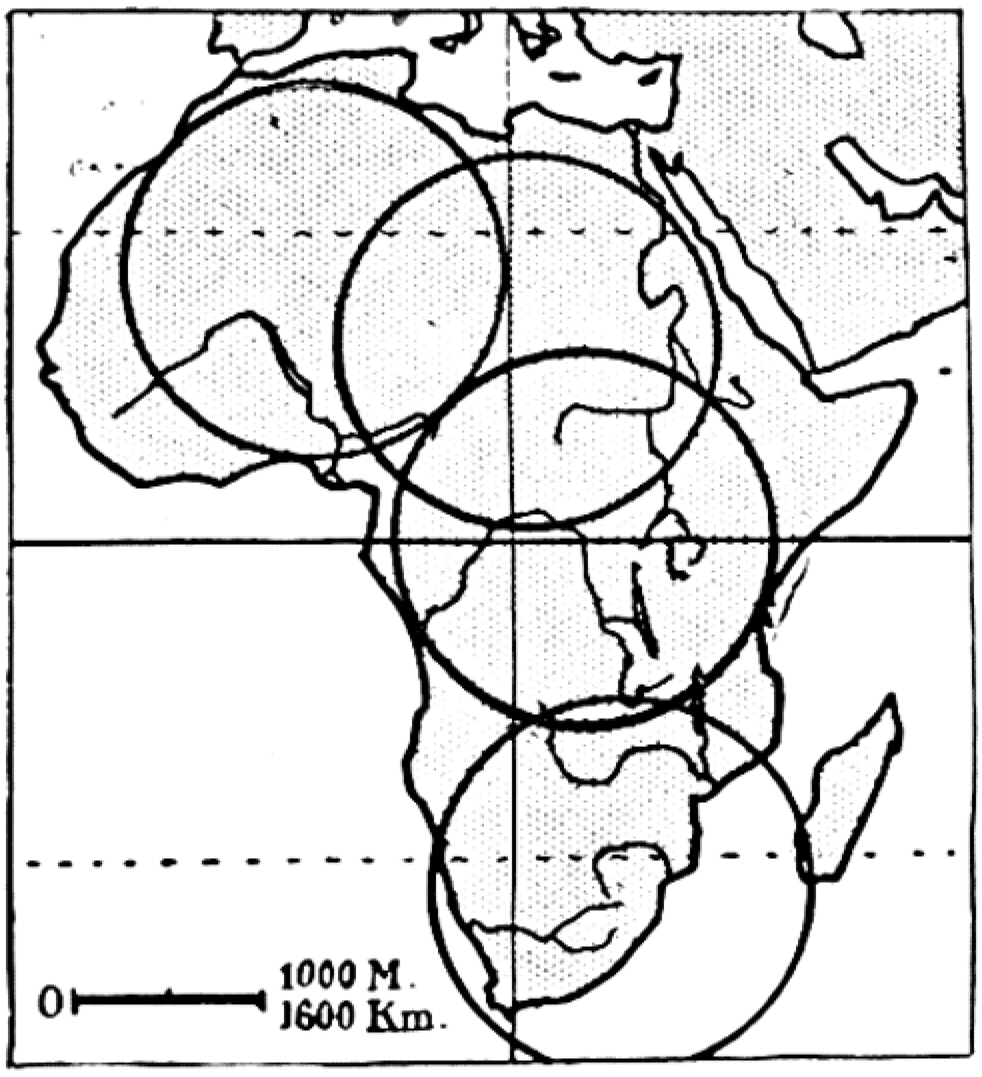


Fig. 34.
Distance from the Sea in Africa.

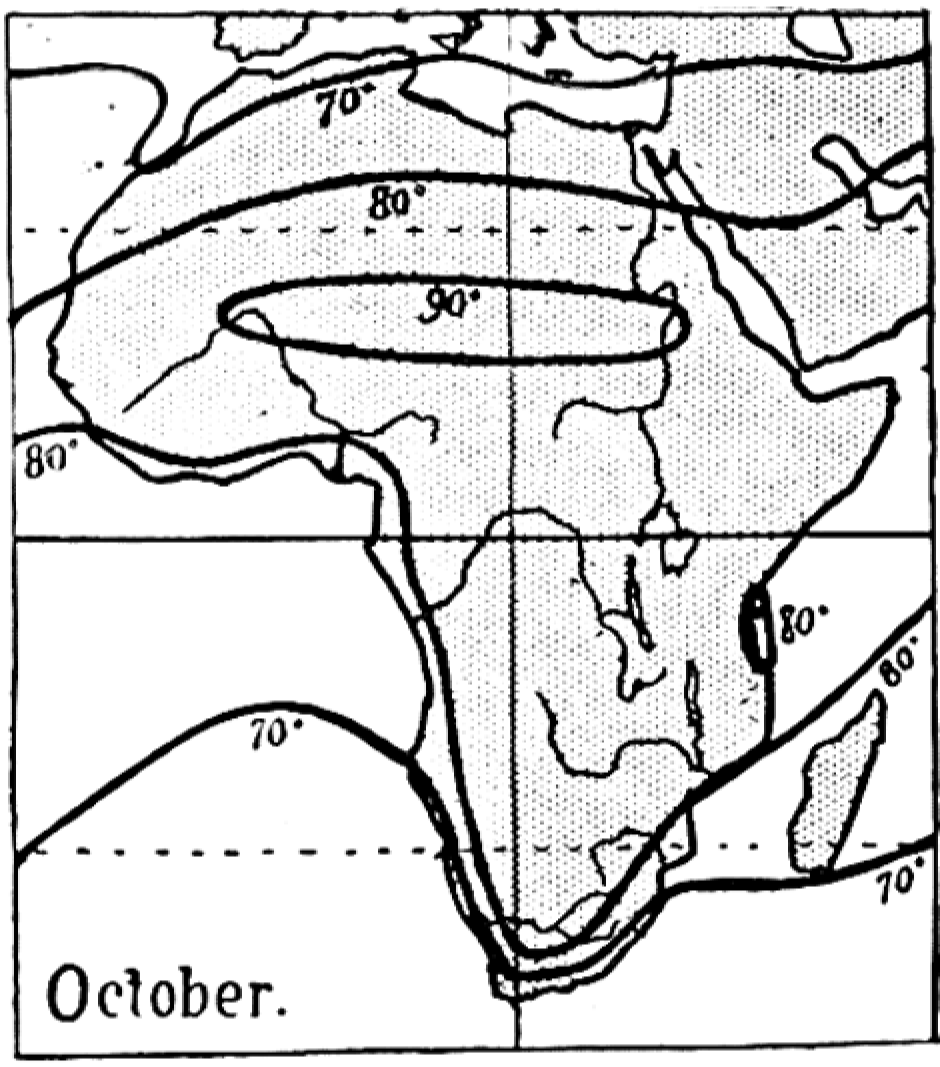


Fig. 35.
October Isotherms of Africa.

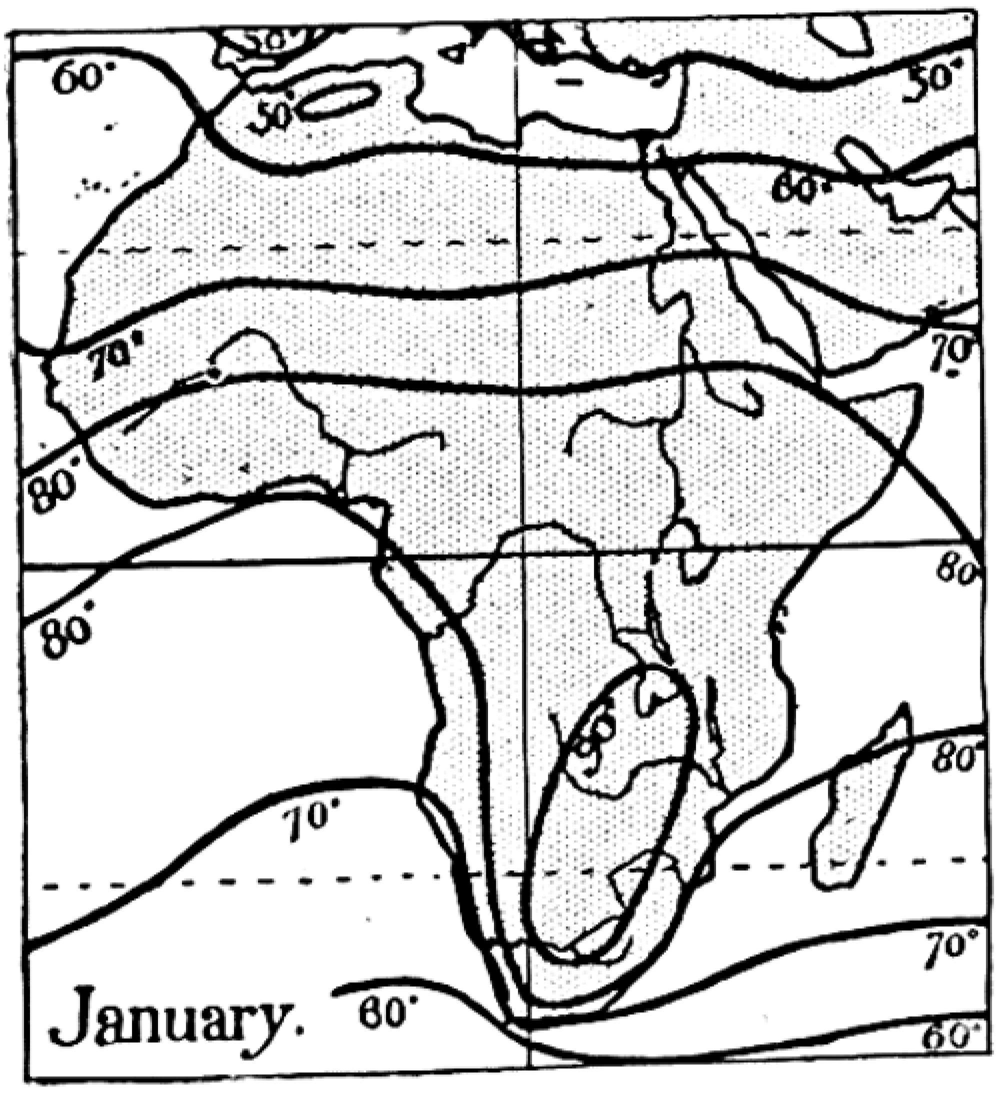


Fig. 36.
January Isotherms of Africa.

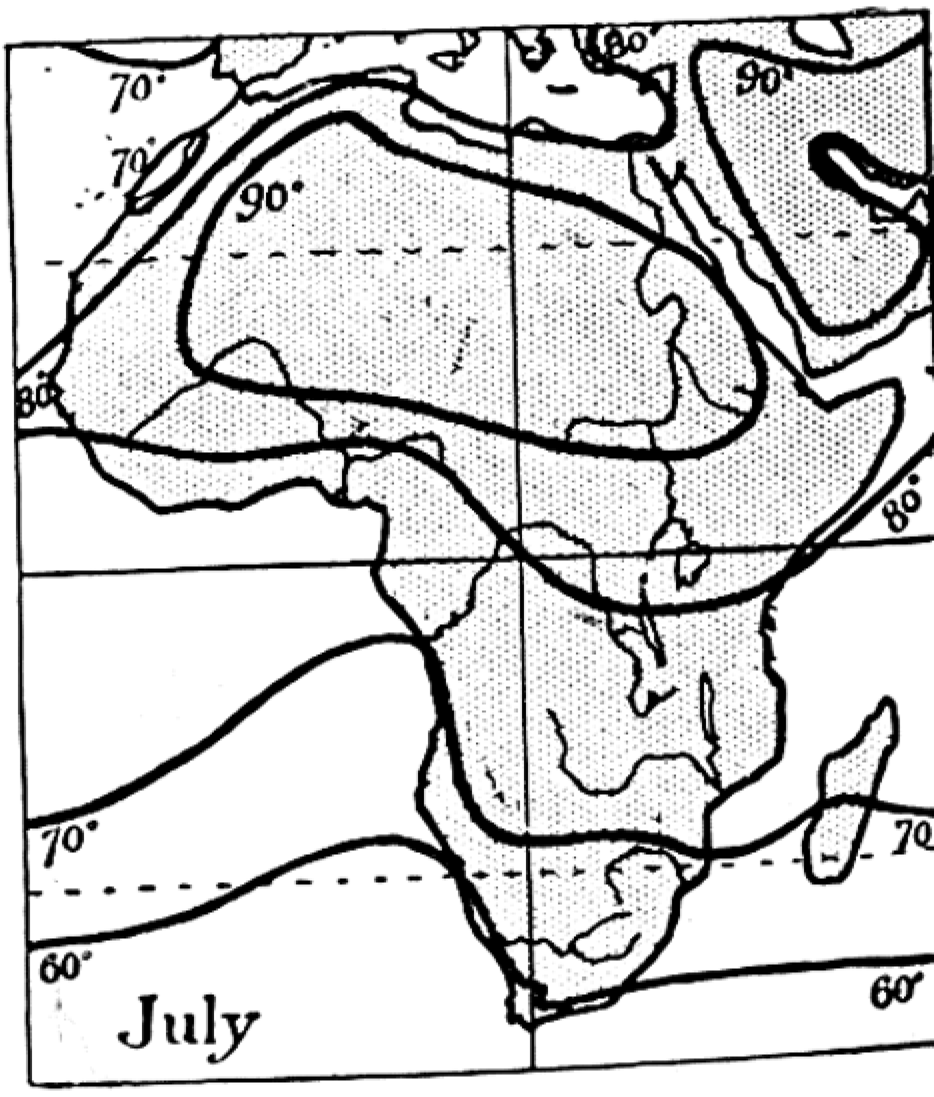


Fig. 37.
July Isotherms of Africa.

enough to intercept the winds from the Indian Ocean. Notice also that the east coast, which is high, and which is first reached by the trade winds, is markedly wetter than the west.

920. The isotherms drawn in the maps in Figs. 35, 36, 37 have been corrected for the difference in height (§ 48), and the maps show how the isotherms would run if the whole continent were at sea-level.

921. Three isothermal maps are given: (i) for July, when the Sun is shining overhead at the Tropic of Cancer and the hottest lands are north of the equator; (ii) for January, when the Sun is shining overhead at the Tropic of Capricorn and the hottest lands are south of the equator; and (iii) for October, when the Sun is overhead at the equator at the autumn equinox and the belts of heat are most regularly arranged on either side of the equator after the autumn solstice. In January, only the northern part of Africa has a mean temperature of less than 70° F. In the south-east, a vast region has a summer temperature of over 90° F. In July, only the extreme south and a small area on the north-west coast have a temperature of less than 70° F., and the greater part of North Africa has a temperature of over 90° F. In October, there is a hot region over North Africa, where the land is gradually cooling, and a smaller one over part of South Africa, where the land is gradually heating.

922. Rainfall of Africa. Before looking at the rainfall map of Africa recall the distribution of rainfall in Asia (§ 693). In the latitudes where the trade winds blow a broad belt of desert stretches across that continent, but south of it is a wet region with either monsoon or equatorial rains. Figs. 38, 39 show that the equatorial region of Africa is also the wettest, and that more rain falls north of the equator than south of it. North and south of the wettest belts are regions of moderate rainfall, which pass first into dry and then into almost rainless regions. In this map the figures in § 915 correspond much more closely with the actual lines on the map, the isohyets as they are called, than the temperature figures correspond with the isotherms.

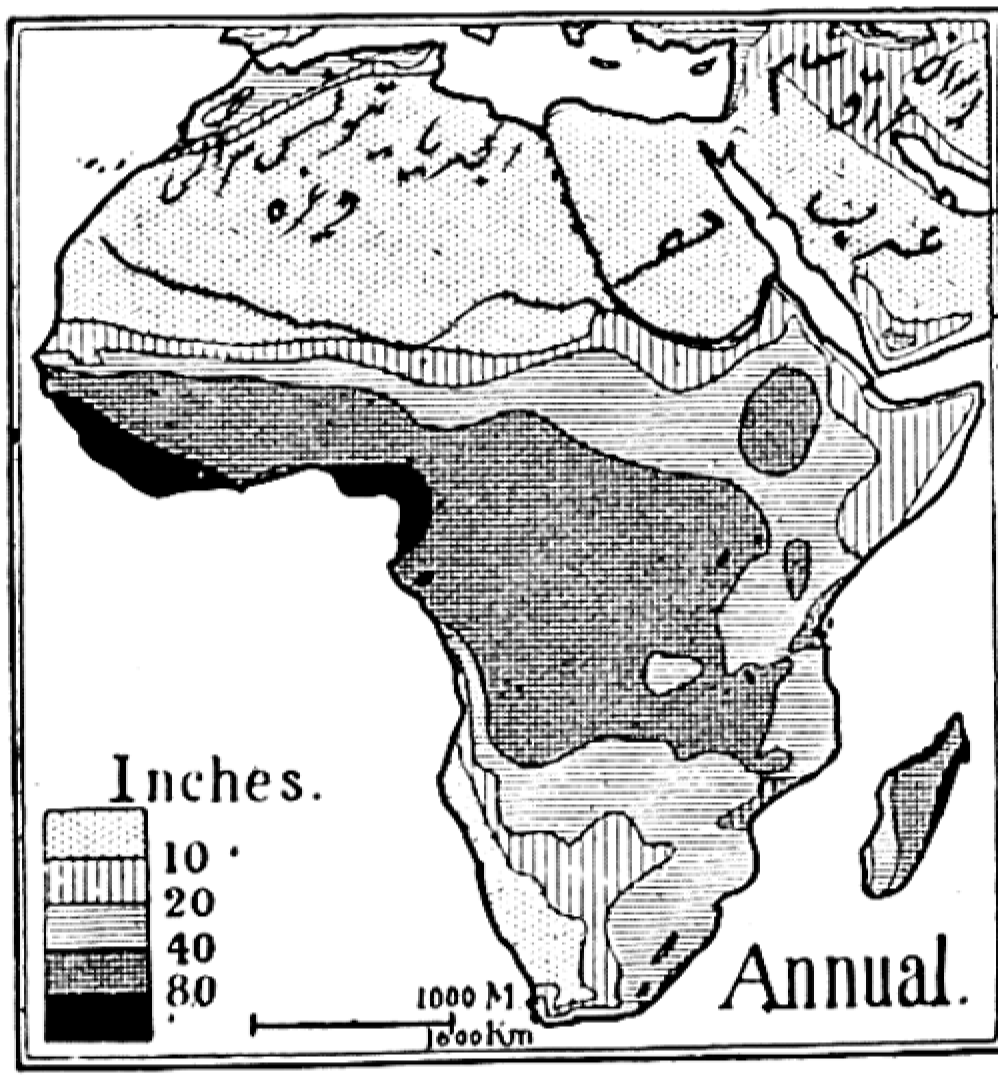


Fig. 38. Mean Annual Rainfall of Africa.

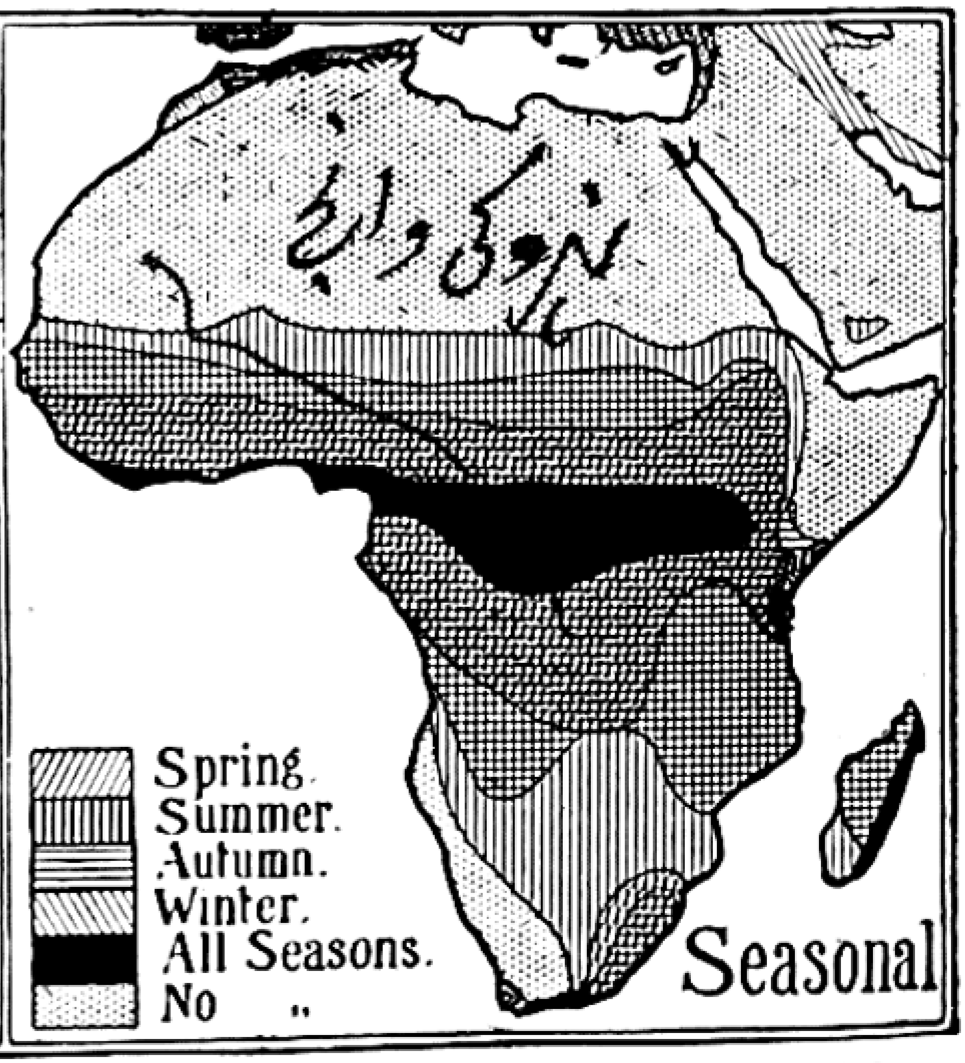


Fig. 39. Seasonal Rainfall of Africa.

Much of North Africa is left white in both the rainfall maps, showing that it is dry at all seasons.

923. The seasonal distribution of rain is very important. A belt north of the equator has rain at all seasons, and the rest of the equatorial region has rain at every season except during the winter of its hemisphere. Elsewhere in the tropics rain falls in the summer of that hemisphere. In the Atlas region and in the south-west of Cape Colony winter rains are brought by the prevailing westerlies, which then blow farthest towards the equator.

924. With the help of the rainfall maps we can now explain why the summers are hotter in the dry regions north and south of the tropic than between the tropics. The map in Fig. 39 shows that a broad belt of Africa has either rains all the year round, or at every season except in winter. This causes a screen of clouds between the Earth and the Sun, which reduces the actual temperature, but makes the heat unbearably oppressive. In the dry regions there is no such screen of cloud, and the rays of the Sun beat down fiercely on a soil which has no covering of plants to prevent it from becoming intensely heated.

924a. In Asia the hot deserts also have hotter summers than wetter lands in lower latitudes.

925. The Tropical Climate. With the help of the figures and maps we can now describe a tropical climate such as prevails over much of Africa. The Sun is always nearly vertical, and the days are nearly the same length as the nights all the year round. Day and night are always equal at the equator. In tropical lands the heating power of the Sun's rays varies little at different seasons, and there is consequently little difference between the temperature of summer and winter at sea-level. The seasons are marked by difference of rainfall rather than by difference of heat. The rain falls in the hot season, when the air over the heated land is rising, forming a low-pressure area. Near the tropics the year consists of two seasons only, a hot wet summer and a hot dry winter. Near the equator there is a belt which has four seasons, two relatively dry ones, and two wet ones, the latter occurring when the Sun crosses the equator at the spring and autumn equinoxes.

926. The belt of rain follows the Sun north and south, but the equator is always in it. At Zomba, the heaviest rainfall is in January and February, in the Shire Highlands in February, at Entebbe on Lake Victoria in April, at Wadelai on the Upper Nile in May, and in Abyssinia in July. Notice that the rainy season occurs a little later than the vertical Sun of these places, as the land gradually becomes hotter. Similarly, June, the month of the summer solstice, is not the hottest month in this country, nor is noon, when the Sun is highest, the hottest hour of a summer day.

926a. Owing to the different arrangement of land and sea the equatorial cloud belt is broader north than south of the equator. It oscillates between 8° N. lat. and 2° S. lat., and between these latitudes are the regions which have two wet and two dry seasons.

926b. Evaporation is much greater in low latitudes. An annual rainfall of 30 inches, which is ample in temperate lands, is very scanty in equatorial lands.

927. Climate and Elevation. Highlands are cooler than lowlands (§ 42), and most of tropical Africa lies high, except in the Sahara. This is a great advantage from the point of view of man. The hot steamy coastal lowlands are unfit to be the home of white men, or of the most progressive black races. The most civilized and intelligent African tribes live on the higher, cooler, healthier parts of the plateau, and these regions are also moderately well suited for Europeans.

Exercises

1. Make a table to show the climate of the following places in the order given: Algiers, Alexandria, Cape Town, Aswan, Johannesburg, Timbuktu, Salisbury. Can you explain the difference between places in similar latitudes in North and South Africa?
2. Compare the map in Fig. 35 (October) with those in Figs. 35, 37 (July and January), and explain the differences as fully as you can.
3. Why is the seasonal distribution of rain important? What is the chief characteristic of its seasonal distribution in Africa?
4. 'The seasons are marked by difference of rainfall rather than by difference of heat.' To what climate does this apply? How can these facts be explained?
5. Which parts of Africa have the most extreme climate? Account for this fully.

CHAPTER III

PLANTS, ANIMALS, AND MEN

928. Much of Europe consists of tundra, temperate forests, and steppes or temperate grasslands; but Africa is in latitudes where these are found only at great heights. The surface of Africa is covered with tropical forests, savanas or tropical grasslands, scrubs, and deserts. A small part of North and of South Africa produces Mediterranean plants.

929. Plants and Rainfall. In the hot equatorial belt rain falls at all seasons, but most heavily at the equinoxes. Heat, moisture, virgin soil, and abundance of plant food produce hot wet forests, in which flowers and fruits occur at all seasons.

930. Outside the equatorial belt of heat and moisture plant growth is checked every year by a dry season. Where this lasts only a few weeks or months the country is a savana or tropical grassland, except where the soil is markedly infertile. The savana grasslands are dotted with clumps of trees, and are therefore often called park lands. As the dry season becomes longer plants become fewer and the savana passes into a scrub land. If the dry season lasts throughout the year the region is a desert.

931. Adaptation to Drought. Where heat, moisture, and good soil are found together plants grow very quickly, but only the root life goes on in the dry season. Most tropical trees shed their leaves in the dry season, and the evergreens have leaves which lose little moisture by evaporation. Some are much divided, like the fronds of evergreen palms or the feathery leaves of acacias, while others have thick, fleshy, varnished leaves protected by oil, gum, or resin. The drier the region the drier and more thorny do the leaves become; e.g. the heaths of South Africa, or the thorny plants of

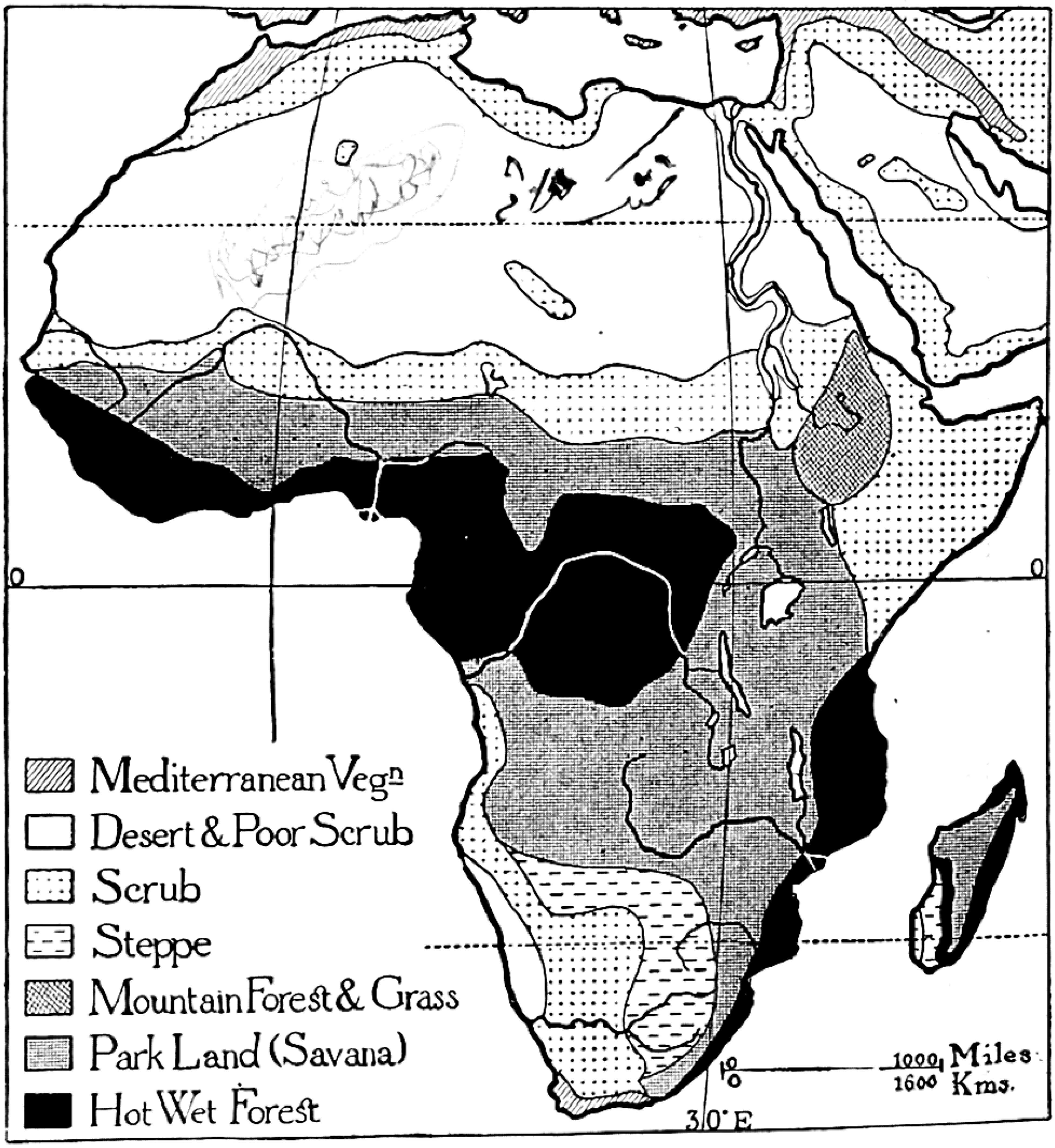


Fig. 40. The Natural Vegetation of Africa.

the Kalahari and the Sahara. The Mediterranean trees, the olive, the evergreen oak, the umbrella or stone pine, &c., also reduce their leaves to the smallest possible size.

932. Many plants store water in their tissues. Lilies, irises, and other bulbs have swollen fleshy roots which shrivel in the dry season but swell when growth begins again. The trees of many dry regions, notably of Somaliland on the Red Sea, produce balsam, frankincense, and myrrh. The baobab, the largest savana tree, stores water in its trunk and branches, and develops these to a great size; while its leaves are small and fall in the dry season. A common plant in the Kalahari desert is a water-melon, which is eaten both by animals and men.

933. Animals and Climate. Animals are adapted to the region in which they live. In lands with cold winters they have thick fur coats, but most African animals have only a light coat of hair. Forest animals are generally striped or spotted to match the shifting lights on the tree trunks; e.g. the leopard and many snakes. Many forest birds are green to match the leaves, and the common grey parrot with a red tail looks like some gorgeous blossom. Brilliant spotted butterflies are difficult to see, and are also protected by their swift flight. The elephant and hippopotamus are self-coloured, and are savana animals. The tawny lion matches the bare sand of the Sahara and the Kalahari, and the yellowish savana grass.

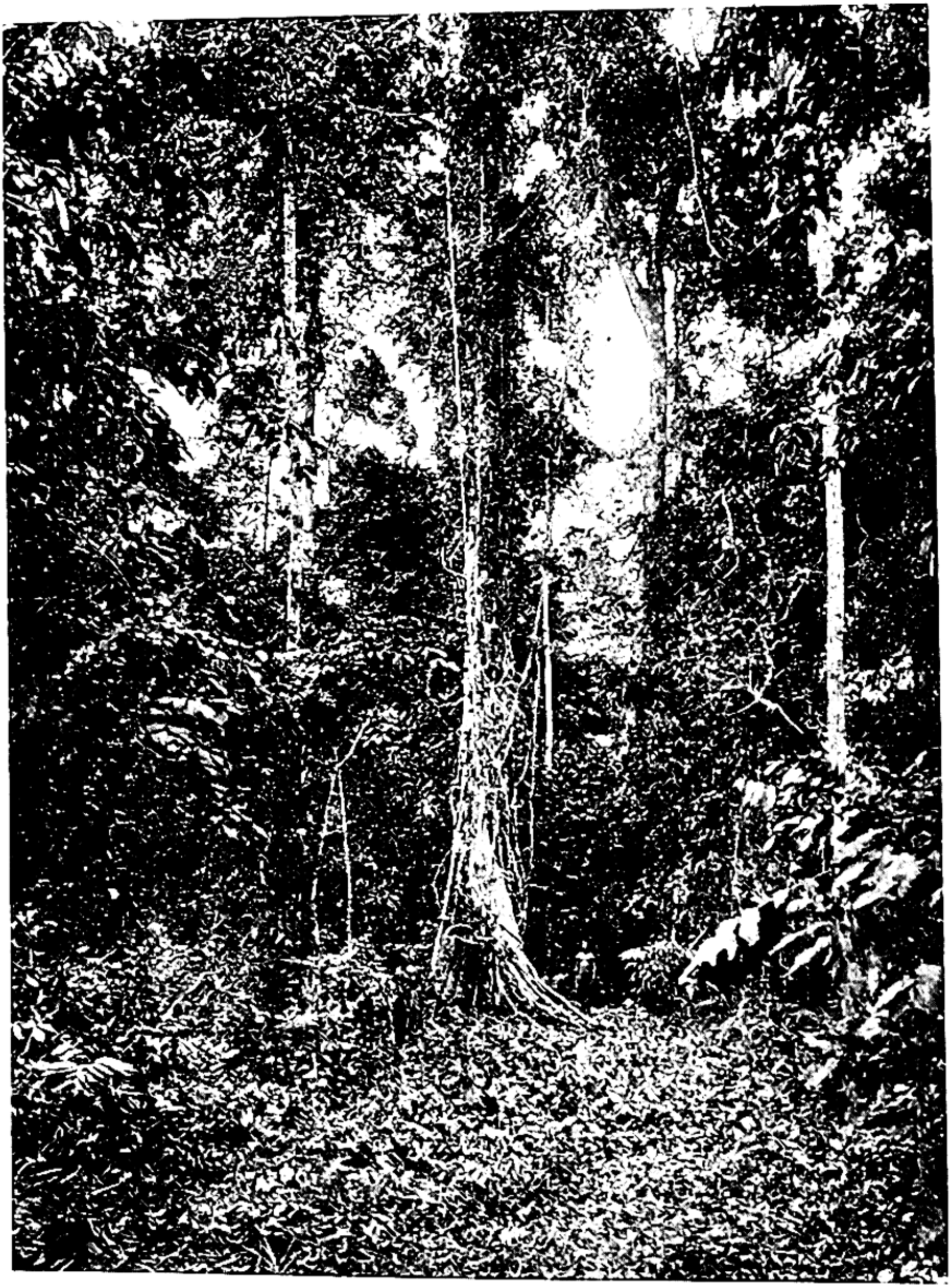
934. Animals are helped by their speed when they are small, and by their bulk when they are large. The typical forest animals either flit through the branches (butterflies, birds, insects), or glide along branches or through undergrowth (snakes), or leap from bough to bough (monkeys, apes). Monkeys and apes can hang by their hands, feet, and tails, and their long arms help them to spring and to reach from bough to bough. Most of the savana animals (antelopes, gazelles, &c.) are swift, and leap easily through the tall grass. The slower elephant and hippopotamus are bulky enough to trample a way through the tall grass. Savana animals, like desert animals, can go long without water, but drink deeply when they reach it. Some birds, notably the ostrich, do not fly, but cover the ground at a quick run. The giraffe raises its long neck and the elephant its long trunk above the tall savana grasses, and thus reaches the leaves and young shoots which form part of its food.

935. Africa abounds with insects. The termite, or white ant, devours all dead vegetable matter, and other ants eat animal food. These are useful scavengers in a hot country. The tsetse fly, which breeds in low swamps, sucks the blood of men and animals, and spreads disease. The locust does great damage in the drier parts both of North and South Africa.

936. Africa produces few domestic animals. The camel, horse, ox, sheep, and pig have all been introduced from outside. Buffaloes are found, but never go far from water, and neither they nor the elephant have been domesticated as in Asia.

937. Plant Belts. Compare the vegetation map in Fig. 40 with the climate maps (Figs. 35–9). Allowing for differences in the breadth and height of the continent, the plant belts are arranged in the same order north and south of the equator. Hot, moist, tropical forests cover much of the Congo basin and are continued along the Guinea coast. Similar forests are found where the south-east trades strike the high eastern coasts of Madagascar.

938. The tropical forest consists of two stories, each of which forms a world in itself. A hundred feet or two above the ground the great branches of the taller



By permission of the Belgian Government.

Fig. 41. Tropical Forest in the Congo State.

trees, woven together by a dense network of creepers, spread out their blossoms to the light and air. Plants seize on plants, climbing up their trunks to reach the sunlight, and orchids and other parasitic plants root in the forks of their branches. Below is a dark, moist, steamy undergrowth, heavy with the smell of rotting plants, dark with the shade of leaves and branches overhead, intersected by many streams, and often flooded. In the upper forest world brightly coloured birds, butterflies, and other insects flit through the boughs, snakes coil round the branches, and apes and monkeys spring from tree to tree in search of food. In the lower forest reptiles and insects are the commonest forms of life, though some animals seek cover during the hottest hours or follow their quarry within the edge of the forest. The largest forest animals are the human-looking gorilla and chimpanzee, but the gorilla is found only in the West African forests. Both these great tree-dwelling apes are fruit-eaters.

939. The useful plants of the tropical forests include rubber, ebony, bananas, and the oil and wine palm near the coast. The forests are not only difficult to penetrate but species are so numerous that trees of any particular kind grow far apart. A collector must wander over a wide area to find a given tree, and this helps to explain why the tropical forests are little used commercially and are slowly cleared. The coasts of the forest belt are fringed with swamps of mangroves, with long stilt-like roots which lift the branches high above the salt water at high tide. Mangrove swamps are exceedingly unhealthy, especially for Europeans.

940. The Savanas. Fig. 42 shows that north and south of the tropical forest there is a belt of savanas with a hot climate all the year round and a well-marked

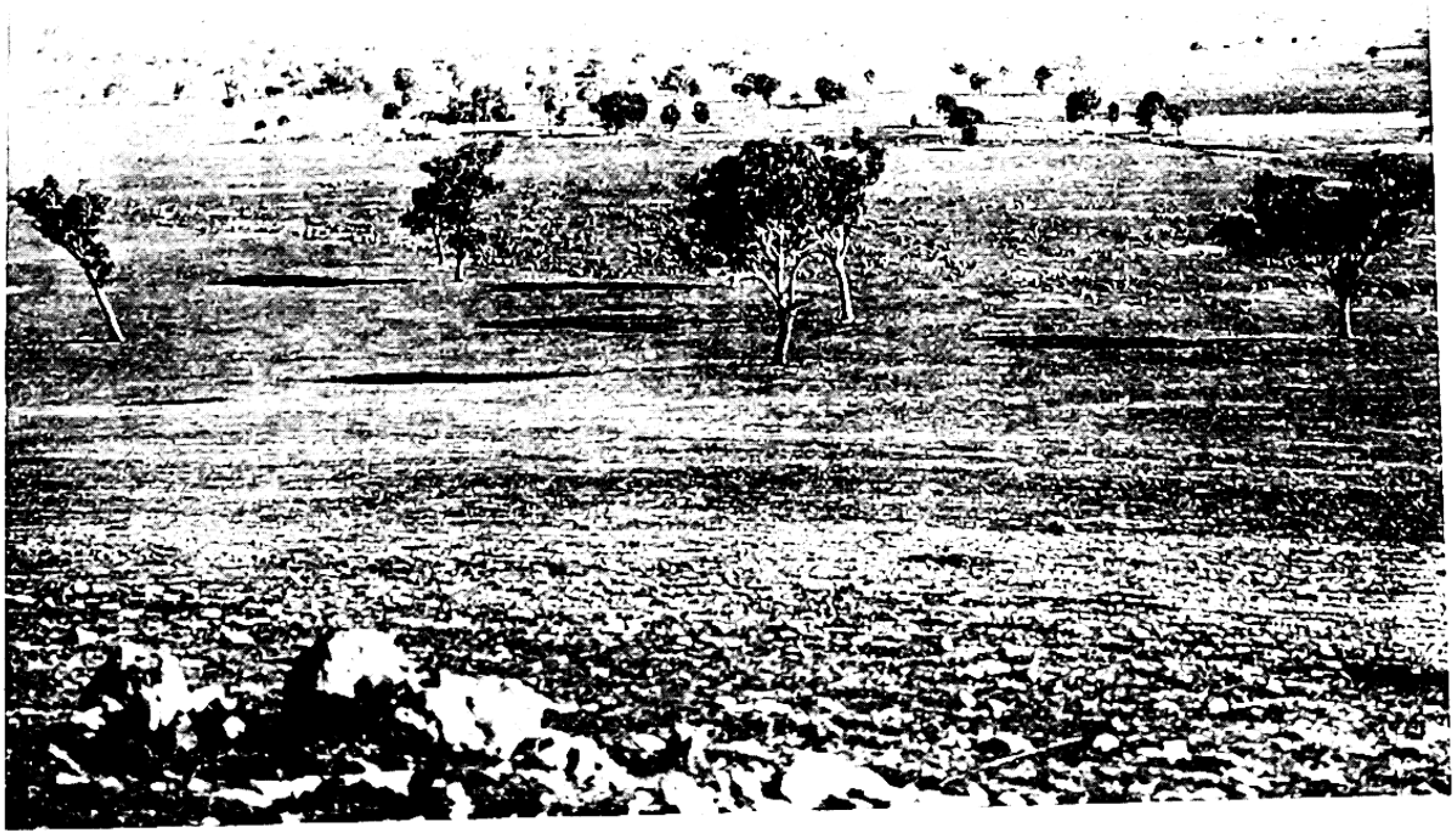


Fig. 42. A Savana Landscape.

dry season. Trees grow in scattered clumps, and form woods only in the wetter hollows and along the rivers. Both trees and grasses have long roots, which draw moisture from a wide area and pierce down to lower wetter layers of soil. Each plant therefore requires a relatively large space, and even the grasses are thinly set in tufts. The dense elephant grass is tall enough to give cover to elephants, and many other kinds are taller than a man. On the poorer soils the grasses are thinner and coarser, and the savana never has the fresh green of temperate grasslands. In the dry season the trees shed their leaves and the grasses wither to a coarse dry straw. The natives set fire to this in the dry season to drive game from cover, kill weeds, clear fresh ground, and secure a quick growth of fresh grass after the first rains. These fires no doubt help to make the savanas treeless.

941. The animals of the savanas are antelopes, zebras, gazelles, giraffes, elephants, rhinoceroses, and other grass-eating animals; and lions, panthers, hyenas, leopards, and other flesh-eating animals which prey on them.

942. Scrubs and Deserts. North and south of the savanas the map shows a belt of scrub passing into deserts. The scrub lands produce thinly-set gummy and thorny plants which provide poor pasture. Both plants and animals are rare in the deserts, where rain only falls in sudden heavy showers at long irregular intervals. The highlands of the Sahara, which are wetter than the lowlands, are sparsely covered with thorny acacias, aloes, cactus, &c.

943. The desert soil is rich in mineral salts, and is fertile where water can be had. Oases vary from a clump of palms to large tracts containing many villages.

944. Three other regions are shown in the vegetation map. These are (i) the Mediterranean lands of North and South Africa; (ii) the Abyssinian Highlands, which receive enough rain from the monsoon winds of the Indian Ocean to produce temperate forests and steppes;

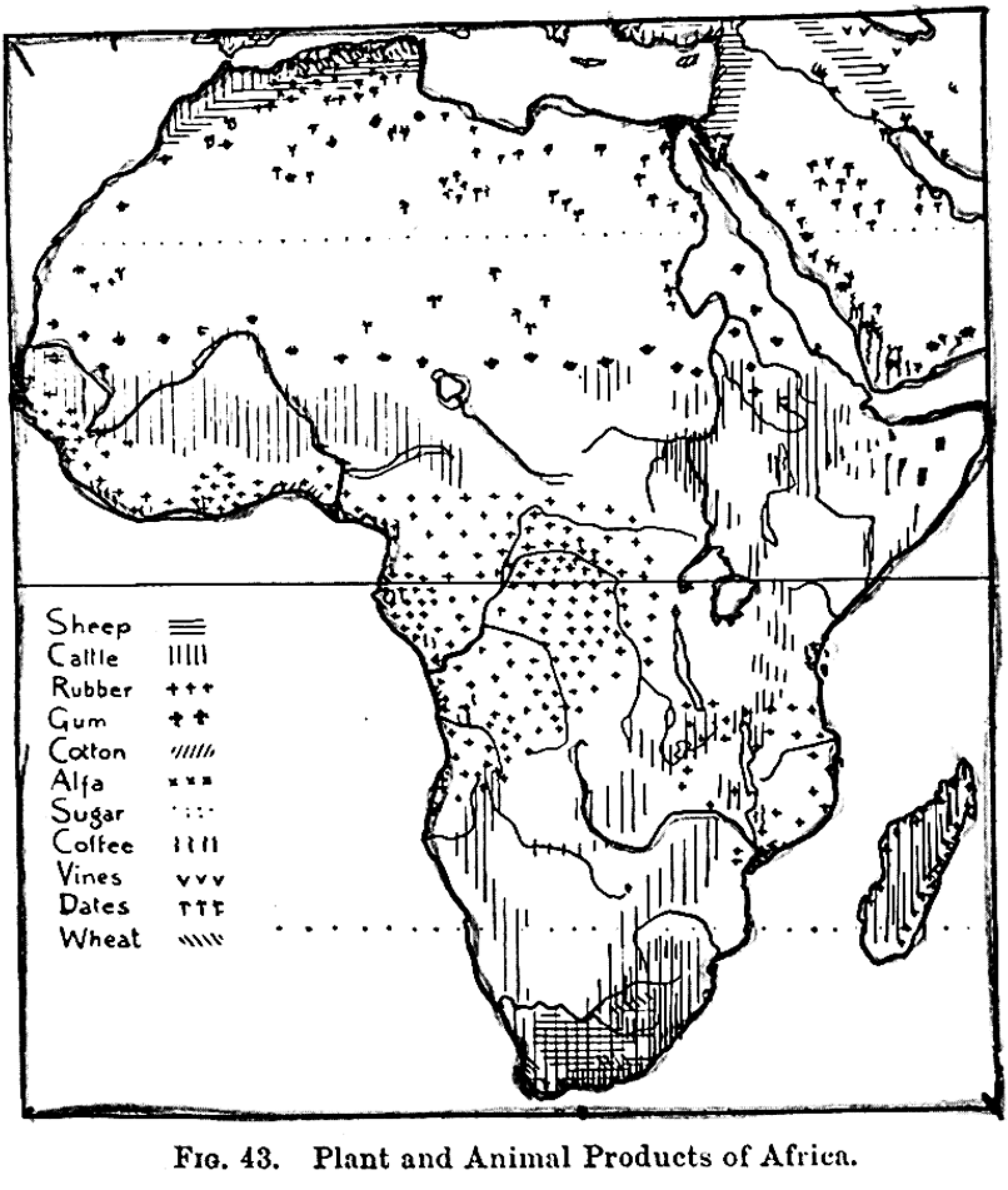


FIG. 43. Plant and Animal Products of Africa.

and (iii) the veld of South Africa, which is high enough to have a temperate climate though it lies partly within tropical latitudes. The veld grasses are not so tall as those of the savanas, and bulbs and thorny plants are common. Trees are rare, but the Australian eucalyptus, which turns its leaves edgeways in the hottest part of the day, and secretes a strong-smelling medicinal oil, has been freely planted.

945. Occupations. Neither the desert nor the tropical forest is well fitted to be the home of man, though trade has always been carried on across the Sahara between the fertile regions which border it. The only true forest-dwellers are the pygmies of the Congo basin, a dwarf race, who neither till the ground nor keep animals but live by hunting and by bartering game for fruit with the tribes of the forest clearings. Probably they are the remnant of an ancient race driven by stronger conquerors into the safer recesses of the forest, and may be related to the dwarf Bushmen of the drier parts of South Africa. Their small size allows them to pass easily through the forest and steal quietly on their prey, and is thus an advantage to them. Many other tribes live in forest clearings, where they till the ground and carry on various arts. They practise gross religions with cannibalism and human sacrifice. The savana peoples have passed beyond hunting, the most natural occupation in the savanas, to the keeping of cattle and agriculture. Many of the coast peoples are skilful traders.

946. The occupation affects the mode of life in many ways. Pastoral peoples are nomadic, while agricultural peoples tend to be settled. The same race may be either nomadic or settled according to its occupation. Thus the Arabs of the Sahara are wandering herdsmen, living in skin tents, whilst in agricultural regions the same race builds and inhabits walled cities.

947. The Races of Africa. The native races of Africa belong both to the white and the black races. The Arabs and Berbers, who are in the majority in

North Africa, though dark-skinned, are of white blood. In Abyssinia, the plateau of the Great Lakes, and in the savana lands south of the Sahara, white tribes have intermarried with the black races who form the bulk of the population south of the Sahara. The Hausas of Nigeria, a mixed race, are highly civilized, and their language is the chief commercial tongue of West Africa. South of the equator, the negroes, who belong to innumerable different tribes, speak Bantu languages, which have a general resemblance to each other. Swahili, the most widely spoken, is the chief commercial language of East Africa. The Zulus and Kafirs of South Africa are Bantus, and form an overwhelming majority of the population.

948. Half a century ago the interior of our maps of Africa was a blank. Many explorers died of the tropical diseases of the unhealthy coastal lowlands, and there were no good routes to the higher healthier interior. When these were discovered, and roads and railways were made, Africa was quickly partitioned among the European powers, but white settlers are still few in number except in the temperate north and south. The British fill most of the official positions in Egypt and the various British colonies, except in South Africa, where the majority of the whites are of Dutch origin.

Exercises

1. Describe the various methods by which plants protect themselves in dry climates. How do they protect themselves in cold climates (e.g. England)? Are there any similarities between the two?
2. Show as fully as you can how wild animals are adapted to their homes.
3. Three plant belts are specially characteristic of Africa. Which are these? Describe fully the climate and plants of any one of them.
4. Which parts of Africa are (*a*) best and (*b*) worst fitted for human settlement? Give reasons for your selection.
5. How far is man adapted to his environment in Africa? Give examples. How far does he adapt his environment to his own needs? Give examples.

CHAPTER IV

THE ATLAS LANDS AND THE SAHARA

949. The Atlas Lands. Morocco (220,000 square miles), Algeria (187,000 square miles), and Tunisia (45,000 square miles) are French, but Spain holds a few places on the coast. Tripolitana (400,000 square miles with Barka and Fezzan) is under Italian control.

950. Climate. Morocco is an Atlantic country, and its most fertile lands and its largest inland towns lie between the Atlantic coast and the base of the Atlas. Northern Morocco is in the track of the Atlantic storms, while Southern Morocco is in the dry trade-wind belt.

Place.	Latitude.	Longitude.	Height in feet.	January Temperature.	Temperature of Hottest Month.	Mean Annual Rainfall.
Cape Spartel .	35° 47′ N.	5° 55′ W.	—	54·1° F.	73·7° F. (Aug.)	30 in.
Mogador . .	31° 30′ N.	9° 42′ W.	—	61·2° F.	71·0° F. (July)	16 ,,
Morocco City .	31° 35′ N.	12° 17′ W.	1,450	50·7° F.	81·5° F. (Aug.)	9·4 ,,
Cape Juby . .	27° 57′ N.	12° 56′ W.	—	60·6° F.	68·9° F. (Sept.)	4·4 ,,
Algiers . . .	36° 47′ N.	3° 4′ E.	72	54·0° F.	78·1° F. (Aug.)	26·9 in.
Oran	35° 42′ N.	0° 39′ W.	190	53·6° F.	79·3° F. (Aug.)	19·0 ,,
Constantine .	36° 22′ N.	6° 36′ E.	2,368	45·5° F.	80·4° F. (July)	22·1 ,,
Biskra . . .	34° 5′ N.	5° 40′ E.	446	52·0° F.	90·0° F. (July)	8 ,,
Tripoli . . .	32° 48′ N.	13° 3′ E.	—	61·4° F.	85·8° F. (Sept.)	18·6 in.

951. Cape Spartel, on the Strait of Gibraltar, near Tangier, in the track of the Atlantic storms, has a much heavier rainfall than Mogador, on their southern margin, while Cape Juby, on a lee coast in the trade-wind belt, has less rain than Biskra in the Sahara. Morocco City, at the base of the Atlas, has an extreme climate with a hot dry cloudless summer, and much less rain than Mogador which is in the same latitude but on the coast. Heavy rains fall on the windward slopes of the Atlas, but the lee slopes are dry.

952. Four Algerian stations are given. Algiers, the most northerly, on a coast which is exposed to the west winds, has a much heavier rainfall than Oran which lies in a sheltered incurve. Constantine, which is inland and more than 2,000 feet higher than Algiers in the same latitude, is not so wet and has a more extreme climate. Biskra, on the northern edge of the Sahara, has a typical desert climate with great extremes of temperature and hardly any rain. Tunis is surrounded by the sea on two sides, and the coast has an equable climate and a moderate rainfall but the interior has a dry extreme climate. Tripolitana is a desert except along the coast.

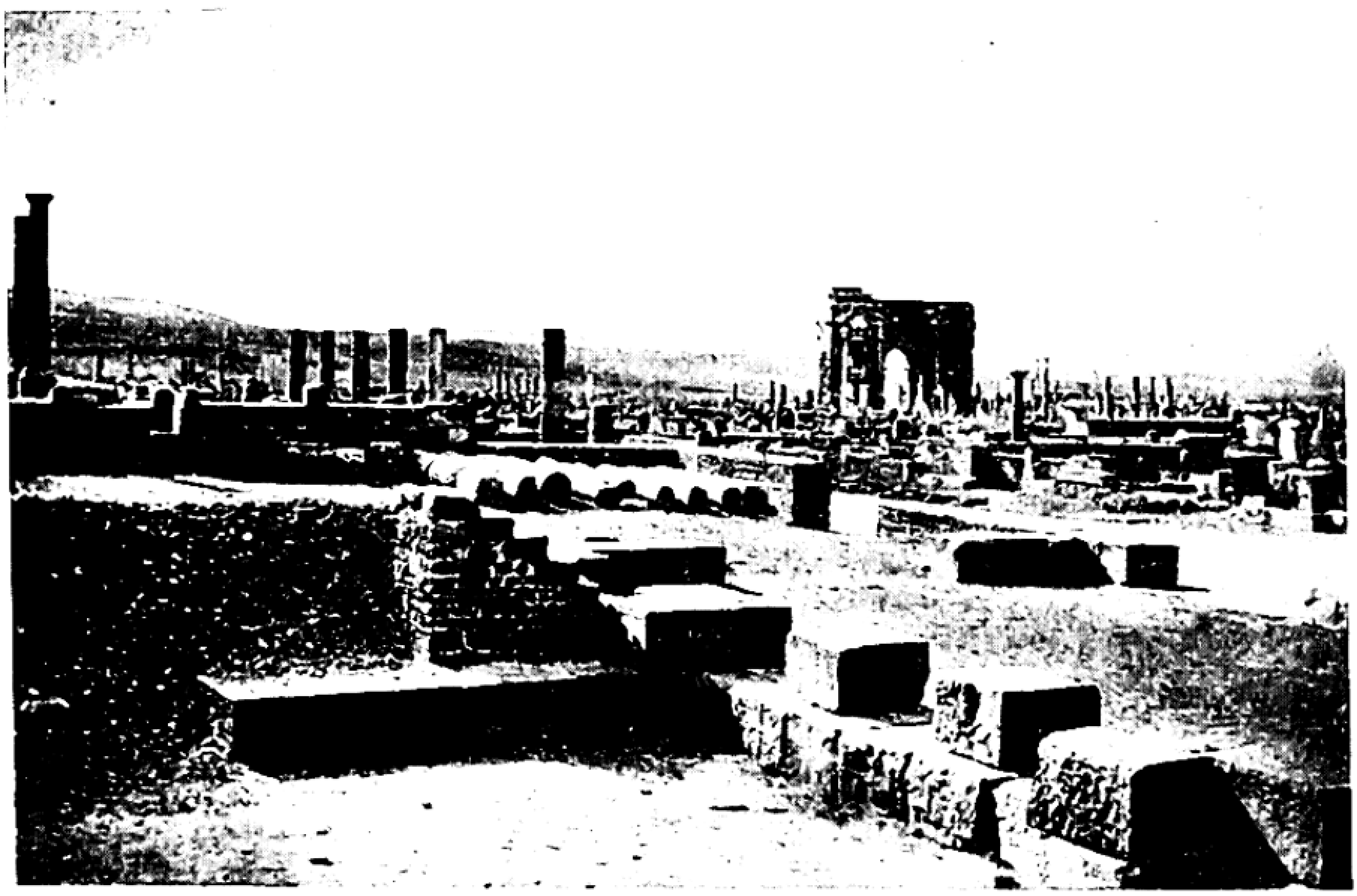
953. In all the Atlas countries winter is the wet season and rain seldom falls between March and September except on the highest ranges of the Atlas. Snow falls occasionally on the higher plateaus and ranges, and the highest peaks are above the snow-line. The climate is most equable on the coast and most extreme in the desert, where the surface becomes greatly heated during the hours of cloudless sunshine and cooled after sunset. Dry winds (harmattan, scirocco, simoom, khamsin) blow out from it, and are so laden with fine sand as to produce a dense fog.

954. The coastal belt is the most fertile part except in the drier parts of Morocco. Both the soil and climate suit all Mediterranean plants, especially where irrigation is possible. The high Atlas and the Sahara are unproductive and thinly peopled.

955. The Atlas. The Atlas ranges can be traced for 1,500 miles from the Atlantic coast opposite the Canary Islands to the Strait of Tunis. The Rif Mountains of Northern Morocco are a continuation of the Sierra Nevada on the opposite side of the Strait of Gibraltar. Though little explored as yet, they are known to be very rich in minerals. A belt of lower ground between the Rif Mountains and the Great Atlas opens a route from Algeria into Morocco. The highest peaks of the Great Atlas rise above the snow-line (13,000 feet), few passes are under 7,000 feet, and the whole region is wild and little known. South of the Great Atlas are the lower ranges of the Anti-Atlas, which sink to the Western Sahara.

956. The windward slopes of the Atlas ranges in Morocco are covered with forests of Mediterranean trees, among which the cork oak is common. The lower slopes have been cleared, terraced, and planted with vines, olives, oranges, lemons, and other fruits. The rivers of Morocco rise among the snows of the Great Atlas and are highest in late spring when these melt. Much water sinks through their dry sandy beds or is lost by evaporation, and most of what remains is used to irrigate the lower valleys so that little reaches the sea.

957. In Algeria and Tunisia the mountain belt is broader but not so high. A coastal range runs from near Oran to Cape Blanco, forming a high picturesque coast with beautiful bays and good harbours, like that of Southern Italy. The lower slopes have been terraced and planted in the same way with vines, olives, oranges, lemons, figs, &c. A belt of fertile valleys, known as the Tell, lies between the coastal ranges and the Tell Atlas which reaches the sea at Cape Bon. This is the most fertile part of Algeria, and in Roman days was the granary of Rome. Ruins of ancient cities and extensive aqueducts and irrigation works show how closely it was once settled. South of the Tell Atlas is the high Plateau of the Shotts, with many large salt lakes or shotts. It is a dry region covered with esparto or halfa grass, which is exported and made into paper, or with dry fragrant Mediterranean plants on which camels, sheep, and goats are grazed. This plateau rises on the south to the Saharan Atlas, which falls steeply to the desert.



Photograph by A. G. Collier.

Fig. 44. A Ruined Roman City in the Desert.

958. The rivers of Algeria rise in the Plateau of the Shotts and flow through the outer ranges in narrow gorges. The Shelif and the Majerda are the longest rivers flowing to the Mediterranean, and their wide lower valleys form important routes from east to west. The Algerian rivers carry most water in the winter and are lowest in the dry summer. As many flow in gorges they can only be used for irrigation where their lower valleys widen out.

959. Mediterranean plants, especially wheat and the vine, come to perfection in the Tell, where the dry summers allow them to ripen fully. Grapes are made into wine in Algeria and dried into raisins. This method of preserving them for food is common in all Mohammedan countries where wine is forbidden by religion. The finest olives in the world are grown in the lower Majerda valley round Tunis. Barley, maize, millet (a common cereal in hot lands), peas, beans, lentils, and all Mediterranean fruits are grown.

960. Animals. The lion, panther, hyena, bear, jackal, antelope and gazelle are among the wild animals of the Atlas. The bear is not found south of the Sahara. The camel, horse, sheep, and goat are the chief domesticated animals. Swarms of locusts often come north with the hot dry south wind, and do much damage to crops. The stork, swallow, and cuckoo fly south to North Africa in winter.

961. The Sahara. The great desert of Northern Africa is almost as large as Europe. Much of it is covered with sand dunes, and elsewhere there are tracts of stony desert. Rock waste goes on very quickly, for there is no plant covering to shield it from the extremes of heat and cold. The wind carries away the finer particles and piles them up in dunes, but the heavier particles are left behind.

962. The Tibesti Highlands stretch for 1,000 miles across the Central Sahara and reach 7,000 feet. These receive some rain, and oases are found along their base. Some parts of the Sahara are below sea-level and are filled by salt lakes or shotts.

963. Outside the oases, or fertile spots, the desert dweller depends almost entirely on his camels, which supply skins for tents, bottles, and other utensils, as well as milk for food. A regular trade goes on by camel caravan between the Mediterranean and the lands south of the desert. European goods which have been brought to the Mediterranean ports, salt from the desert and dates from the oases are exchanged for the gold, ivory, cotton cloths, ostrich feathers, kola nuts and other produce of the rich lands south of the desert. Caravans follow fixed routes from oasis to oasis, and travel in large parties as a protection against robbers.

964. The date palm is as important in the oases as the camel is in the desert and is well suited to the desert climate. The water which its roots need is supplied by irrigation canals, and the sugary fruit is spoiled by even a single shower. Many other Mediterranean crops are planted beneath the shade of the date groves in the larger oases.

965. Occupations. The agricultural Berbers live in small fortified villages in the valleys of the Atlas. The trading Arabs live in the towns, while the Arab herdsmen of the desert are tent-dwellers. The Europeans are merchants and settlers and have their own quarters in the larger towns. The streets are very narrow in all the native quarters and villages, and the high windowless houses are painted white for coolness. Goods are sold in covered bazars as in many parts of Asia. The mosques, or Mohammedan churches, are dark and cool with rounded arches inside and domes and tall slender minarets outside. Many manufactures are carried on. Metals are skilfully worked and jewellery is made from the silver and gems found in the mountains. Fine silks and stuffs are beautifully embroidered, and skins are tanned into morocco leather, which is dyed and richly ornamented.

966. Morocco. Morocco (220,000 square miles) is fertile and rich in minerals. There are no railways or good roads, and outside the larger towns travel is dangerous. Fez, Mequinez, and Morocco City or Marrakesh all lie several hundred feet above the sea at the base of the Great Atlas, in fertile country where the hills are terraced and cultivated with fruits, and the irrigated plains are planted with wheat and other food crops. Tangier, the largest coast town, on the Strait of Gibraltar, is a European town with an Arab quarter. Ceuta, opposite to Gibraltar, is held by Spain. Mogador and Agadir are poor ports on the Atlantic coast, which is bordered by a belt of high sand dunes several miles wide. The largest oasis is Tafilet, which contains many villages and has nearly 500 square miles planted with dates, which are grown for export.

967. Algeria (343,000 square miles). Nearly all the population is found in the coast towns (Oran, Algiers, Bougie, Bône), and in the Tell. Algiers, on a fine bay opening to a fertile region, is the capital and largest town. In the Tell are Orleansville in the Shelif valley, and Constantine, which is built on a spur of the plateau surrounded by deep ravines and commands all the principal routes of the Tell. It is connected with Algiers and the coast by a railway which skirts the base of the Kabyle mountains, inhabited by Berber tribes, and is carried south by the gorge of El Kantara to Biskra. All the coast towns from Oran to Tunis are connected with each other by a railway which follows the valleys of the Shelif and Majerda. The French have built good roads, constructed irrigation works, encouraged agriculture, and sunk many wells in the Sahara. The largest oases, Wargla and Tugurt, are both irrigated by deep artesian wells.

967a. The underground water of the Sahara forms what is called an artesian basin. Rains fall on porous rocks in the Atlas, sink through them and find their way underground to lower levels. Where this underground water can be reached an oasis can be created.

968. Tunisia. Tunis, the capital and largest town, is a busy port on the Strait of Tunis where the routes from the eastern to the western Mediterranean cross those from Northern Africa to Europe. Sfax, to the south, is the second town. Bizerta, north of Tunis, with a good natural harbour, is a great naval station. In the south rich deposits of iron ore are worked.

969. Tripolitana. Tripolitana was made fertile by irrigation in Roman times, but now produces little but halfa grass and dates. Tripoli, the capital and port, is the starting-point of many caravan routes, which cross the desert where it is narrowest.

Exercises

1. Draw a map of Northern Africa, shading land over 3,000 feet high. Mark Mogador, Morocco City, Tangier, Algiers, Tunis, Tripoli.
2. Explain fully what is meant by a Mediterranean climate. How does it affect (*a*) the plants, (*b*) the animals, and (*c*) the occupations of a region?
3. With what part of Asia would you compare (*a*) the Mediterranean Atlas lands and (*b*) the Sahara?
4. 'The Arab herdsmen of the desert are tent-dwellers.' Explain why this is necessary, and describe as fully as you can the tent-dwellers' life.
5. Write a short account of Algeria outside the Sahara.
6. What is an artesian basin? How can it be utilized?

CHAPTER V

EGYPT AND THE NILE LANDS

970. Egypt. Egypt is the north-eastern part of the Sahara lying between the Eastern Mediterranean and the Red Sea. Its nominal area is 300,000 square miles, but less than 12,000 square miles are fertile and the rest is desert. Inhabited Egypt is a long narrow oasis, consisting of the lower valley and delta of the Nile.

971. The Nile. The Nile is 4,000 miles long, and for the last 1,500 miles flows across the desert. The existence of so great a river in a rainless region and its summer floods remained a mystery till the middle of last century.

972. The coloured map shows that the Nile rises south of the equator, and gathers up the waters of many rivers and lakes of equatorial Africa. Equatorial rains fall throughout the year in the upper basin of the Nile and supply the permanent flow of the river. If the Nile had risen north of the equator and had had a shorter course in the rainy belt it would hardly have reached the sea all the year round.

973. Its floods occur during the northern summer when the Sun is vertical at the Tropic of Cancer and the northern tropical lands have their wet season. This suggests a connexion between these summer rains and the summer floods of the Lower Nile. Many tributaries flow to the Nile in the belt of summer rains, but the left bank tributaries cross low country where they widen into great swamps, and carry little water into the main stream. The right bank tributaries rise at a great height in Abyssinia, a region of summer monsoon rains, descend in steep valleys, and carry an enormous volume of water in summer, but are almost dry in winter. These heavy summer rains of Abyssinia are now known to cause the floods of Egypt.

974. The Upper Nile. The Kagera, which flows north to Lake Victoria (Victoria Nyanza), is generally taken as the head-stream of the Victoria Nile. This lake, which is crossed by the equator, lies 3,720 feet above the sea and receives many rivers fed by the equatorial rains. It acts as a great natural reservoir and helps to regulate the permanent flow of the Nile. The Victoria Nile, half a mile wide, leaves Lake Victoria by the Ripon Falls, and descends the escarpment of the western rift valley by the Murchison Falls to Lake Albert, 1,500 feet below. Lake Albert (100 miles long) receives the Semliki, from Lake Edward, which lies farther south in the same rift but 1,000 feet higher.

975. The Nile in the Sudan. After leaving Lake Albert, the Nile, swollen to an immense river, descends from the high lake plateau to the Sudan. At Wadelai, near Lake Albert, it is 2,000 feet above the sea and has a mean annual rainfall of 43 inches. At Gondokoro it is 1,465 feet above the sea, and has a rainfall of over 41 inches. As it flows north its rainfall diminishes and occurs only in summer, and north of 17° N. the Nile flows across the rainless belt.

976. Between Lado, lat. 5° N. and Khartum, lat. 15° N. the Nile falls only about 200 feet and becomes a broad sluggish river. In the wet Southern Sudan it widens out into vast swamps (Lake No), and its many channels are obstructed by islands of floating vegetation, called sudd. The Bahr-el Ghazal, a sluggish swampy river, flows to the Nile from the low marshy country of the west, and the Sobat, the most southerly of the Abyssinian affluents, comes in on the right bank. The Nile flows north across Kordofan, which is rainy in the south and dry in the north, to Khartum, 500 miles below the confluence of the Sobat, where the sluggish main stream, known as the White Nile, unites with the swift Blue Nile from Abyssinia.

976a. Abyssinia, the Sheba of the Bible, famous for gold, spices, and gums, is a plateau 8,000 feet high, with volcanic peaks which reach 15,000 feet. Lake Tsana, in the middle of the country, is drained by the Blue Nile. Much of Abyssinia is pastoral steppe, but coffee, a native plant, and cotton are cultivated. The capital is Addis Abbeba. The Abyssinians are a white race and profess a form of Christianity.

976b. South-east of Abyssinia is the Protectorate of British Somaliland, inhabited by the same race as Abyssinia. Somaliland is too low to condense the monsoon winds, and is a dry pastoral region, producing poor pasture and gums. Berbera, the chief town, carries on a caravan trade with Abyssinia. Somaliland supplies food to Aden, in Arabia, at the entrance to the Red Sea.

977. Khartum lies over 1,200 feet above the sea on the same meridian as Cairo, but the river follows a long winding course between the two places. Khartum has a very small rainfall (§ 915), and the country to the north is rainless. The Nile valley is only a few miles broad, and is cut in the desert sandstones and limestones, which form high cliffs on either side. West of the Nile are the Libyan Hills with a line of oases at their base. East of it are the high Nubian Hills (7,000 feet) which cut the Nile valley off from the Red Sea.

978. The Atbara, from Abyssinia, enters on the right bank about 200 miles below Khartum, and for the rest of its course the Nile flows across the desert and receives no tributaries. Between Khartum and Aswan, about 1,300 miles, the Nile falls about 800 feet, forming six cataracts. These are reefs of rock which obstruct navigation when the Nile is low but are covered in flood. Only the lowest or First Cataract is in Egypt, and Aswan, with its great dam, is at its base.

979. The Nile in Egypt. In Egypt the Nile valley is still only a few miles wide and is shut in by cliffs, beyond which stretches the desert. As no rain falls, the land is fertile only where it can be irrigated. The valley above Cairo forms Upper Egypt, and is covered with a network of canals, with villages built on mounds above the flood-level. The delta, or Lower Egypt, begins below Cairo. The mud brought down by the floods has choked the distributaries, which form lagoons where they enter the sea from which they are cut off by sand bars. Only the Rosetta and Damietta branches are navigable. West of the delta is the irrigated depression of the Fayum.

980. Climate of the Nile Basin. The following figures show how greatly the rainfall varies :—

Stations.	Latitude.	Longitude.	Height in feet.	Coldest Month.	Hottest Month.	Mean Annual Rainfall.
Alexandria . .	31° 12′ N.	29° 54′ E.	105	57·9° F. (Jan.)	80·4° F. (Aug.)	8·5 in.
Cairo	30° 5′ N.	31° 17′ E.	98	54·1° F. (Jan.)	83·5° F. (July)	1·4 ,,
Aswan	24° 2′ N.	32° 53′ E.	325	61·7° F. (Jan.)	93·3° F. (July)	0 ,,
Wadi Halfa . .	21° 55′ N.	31° 19′ E.	420	59·0° F. (Jan.)	89·9° F. (June)	0 ,,
Berber	18° 1′ N.	34° 4′ E.	1,145	67·8° F. (Jan.)	93·9° F. (June)	0 ,,
Khartum . . .	15° 37′ N.	32° 33′ E.	1,247	69·1° F. (Jan.)	91·6 F. (May June)	4·2 ,,
Addis Abbeba .	9° 2′ N.	38° 44 E.	8,005	60·1° F. (Dec.)	63·1° F. (May)	46·7 ,,
Entebbe . . . (Lake Victoria)	0° 3′ S.	32° 30′ E.	3,906	70·2° F. (Apr.)	72·7° F. (Jan.)	59·1 ,,

981. The **Egyptian Sudan** is well watered in the south, and the Bahr-el-Ghazal region is forested, producing ivory, rubber, and other tropical products. The natives of the Sudan are of mixed blood, the negro element preponderating in the south and the Arab in the north. Much of the Sudan, where the rainy season is between May and September, is well suited for cotton, which needs rain when the pods are forming and a dry season for picking. Sugar might also be grown. The drier parts are better suited for grain, especially millet. Wheat and tobacco are grown in the higher parts of Kordofan, and the acacia forests of the drier parts yield gum arabic.

982. Khartum, at the junction of the Blue and White Nile, is the capital of the Sudan. Many routes reach the

Nile here, and Khartum is the key not only of the Sudan but of Egypt. It was held by Mohammedan dervishes from 1885 to 1898, and was retaken by the British at the battle of Omdurman. During the dervish occupation war, pestilence, and famine reduced the population, but settled government is restoring prosperity. Khartum is connected by rail with Berber, from which lines run to Suakin or Port Sudan on the Red Sea and across the desert to Wadi Halfa in Egypt.

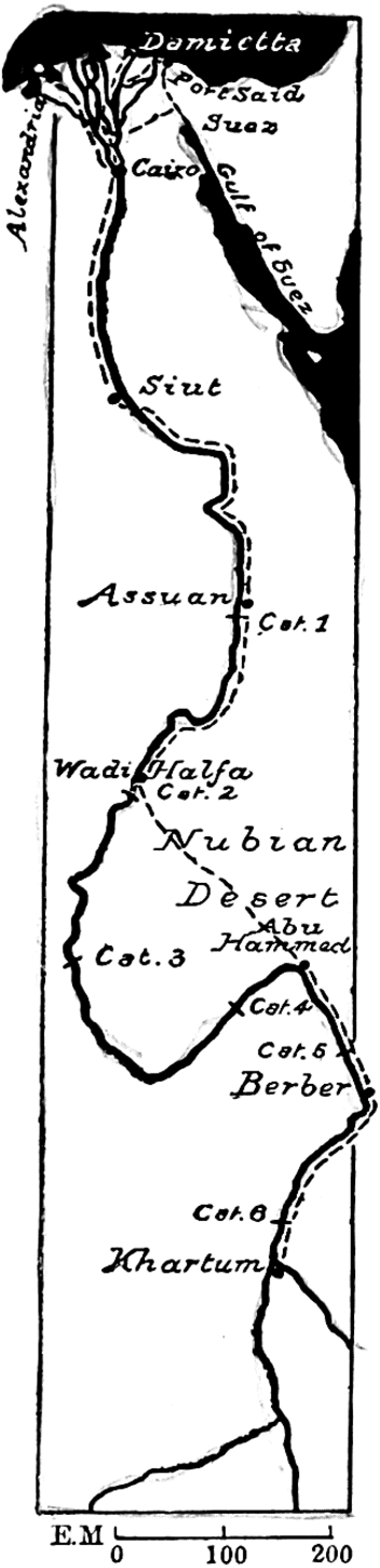


Fig. 45. The Nile below Khartum.

983. Egypt. Egypt is an oasis made fertile by irrigation. It has a desert climate, with hot cloudless days and cool starry nights. The summer heat is often made unbearably hot by the hot dry khamsin wind. Rain never falls except on the Mediterranean coast (§ 915). The Nile floods have covered the valley, which is from 5 to 20 miles wide, with fine silt, raised the land near the river, so that the valley slopes away from it, and built a great delta out to sea.

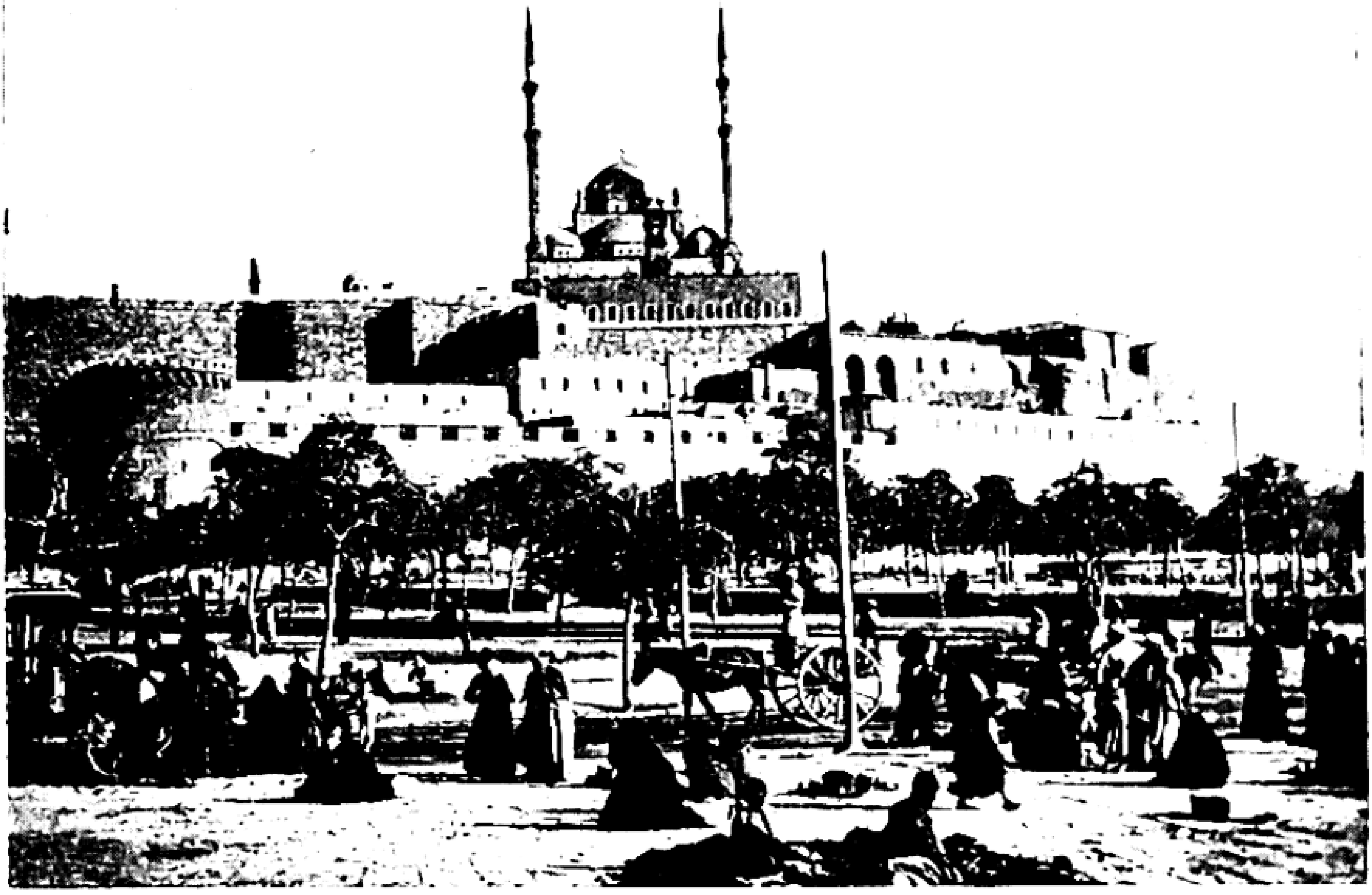
984. The Nile Floods. These are so important that gauges have been set up along the rivers, and the readings are telegraphed daily to Cairo. The Nile is lowest in May, when it is fed almost entirely by the equatorial lakes. As the monsoon rains begin to fall on the Abyssinian Highlands, the swollen rivers sweep down their steep valleys, loaded with rich red volcanic soil. The Sobat rises first, and is followed by the Blue Nile and the Atbara, as the sun moves north. The Nile begins to rise at Aswan in May or June, and continues to do so till the middle of September, when it begins to fall. At Cairo these changes happen about a month later. In a poor year, when the Nile rises about 21 feet, the lands farthest from the river cannot be irrigated, and the next year's harvest is scanty. A good Nile rises 26 feet, and an exceptionally high Nile 30 feet.

985. Egypt has three seasons: (i) Summer, the hot dry season, when the Nile is low (April to July); (ii) high Nile, when most of the valley is under water, and the river is rising (August to the end of November, according to the latitude); and (iii) winter, when most of the land is under crops (December to the end of March).

986. Methods of Irrigation. Irrigation canals fed by the permanent river are called summer canals because they are full even in summer when the Nile is low. They are cut very deep, and dams have been built across the Nile at Aswan and other points to make a sufficient head of water to fill them. The Fayum, Lower Egypt, and an increasing area of Upper Egypt are irrigated in this way and produce several crops a year. The rest of Egypt is irrigated by the flood waters and produces only winter crops. The irrigated lands along the river are divided by dykes of earth, and the water is not allowed to stand more than 4 or 5 feet deep. The floods begin to fall after six weeks, and in October or November crops are planted in the fresh mud left by the receding river. The winter crops grown on these lands include wheat, maize, millet, pulses (pease, beans, lentils), flax, onions and other vegetables. Cotton, the most valuable Egyptian crop, can be grown only on permanently irrigated land. It has a very silky fibre and is made into mercerized fabrics which look like silk. The seeds are crushed for cotton-seed oil, which is made into soap, and oil cake for cattle, and replaces the dearer olive oil in cooking. Sugar and rice are also summer crops.

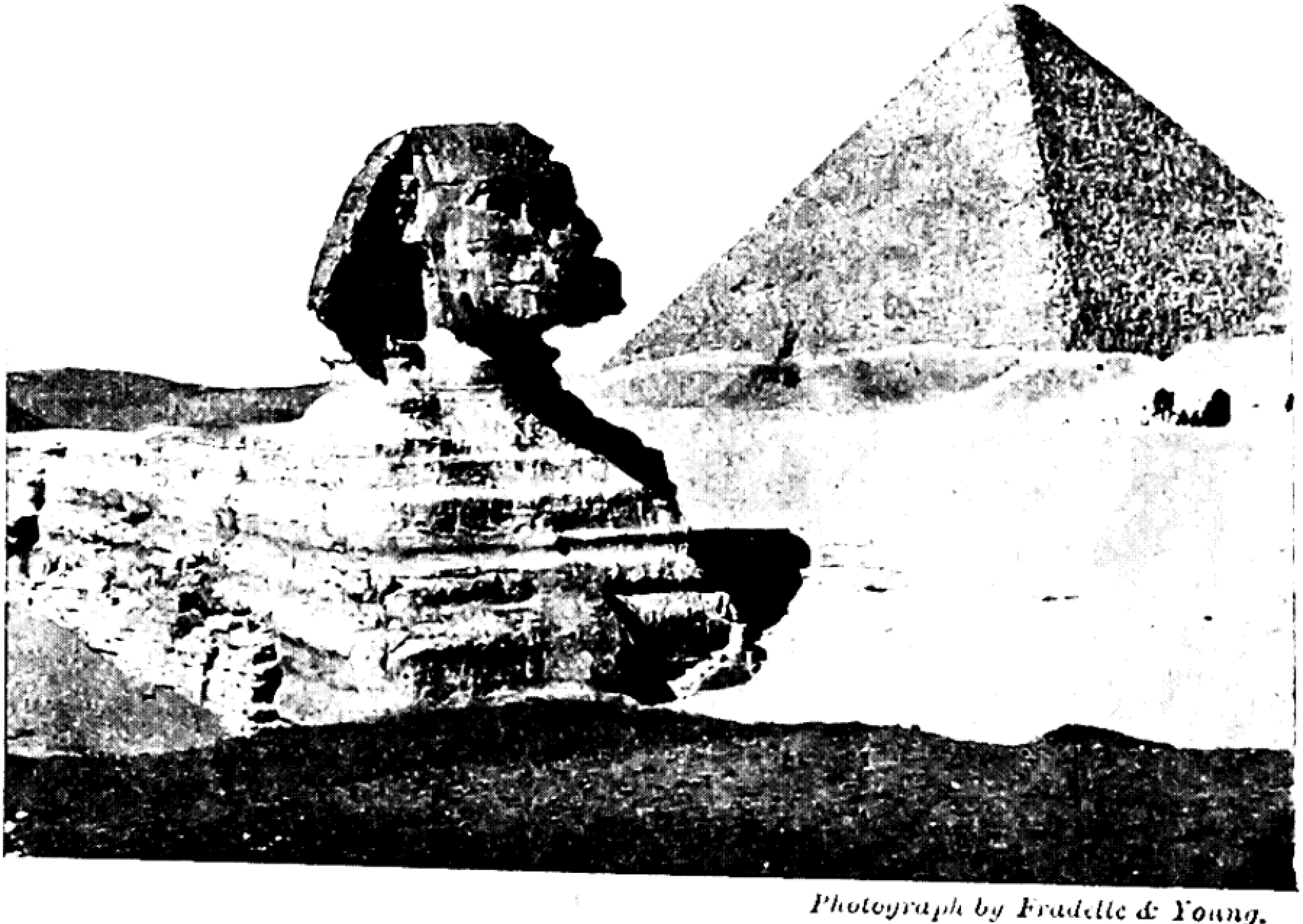
987. Occupations. Egypt has been an agricultural land from the dawn of history, and has a very ancient civilization. Colossal pyramids, temples and sculpture have been preserved by the dry desert air (§ 785a). Pastoral peoples have often raided this rich land, and the last of these were the Turks. Britain now administers the country. Beautiful silk, metalwork, and inlaid wood are sold in the bazars of the native quarters, which have picturesque mosques and cool narrow streets. The crushing of oil seeds, flour-milling, sugar-refining, soap-making, tanning and brewing are modern industries.

988. Towns and Routes. The lagoons and marshes of the delta make it difficult to enter Egypt by the Nile, and elsewhere the coast is a desert. The best routes from the Mediterranean are by Alexandria, west of the delta, and Port Said, east of it. Both are artificial ports, and the latter has grown greatly since the Suez Canal was opened. These routes, and others from the desert, converge on Cairo, at the apex of the delta, near the site of Memphis and Heliopolis, the predecessors of Cairo. A railway follows the Nile to Aswan, where the navigation of the Nile is interrupted by the First Cataract. The ruins of many temples show that this also was always an important route centre. The line will be continued to Wadi Halfa, for the Sudan lines.



Photograph by Underwood & Underwood.

Fig. 46. The Citadel of Cairo.



Photograph by Fradelle & Young.

Fig. 47. The Sphynx and one of the Pyramids in the Desert near Cairo.

988a. The Nile, the only natural route across the desert into Central Africa, is navigable as far as Aswan, but is obstructed by cataracts in the northern Sudan and by sudd farther south. Hence the importance of the Cape-to-Cairo railway, of which various existing lines will form part.

989. The Suez Canal. The high desert peninsula of Sinai cuts the Red Sea off from the Mediterranean, and there was no easy route between the two till the Suez Canal was cut across the Isthmus of Suez. The canal is 87 miles long, and for 21 miles utilizes two lakes which fill depressions. Port Said, the Mediterranean entrance, is a much more important port than Suez at the Red Sea end. The distance from London to Bombay round the Cape of Good Hope is about 11,000 miles, but only half this by the Suez Canal.

989a. Egypt and Somaliland command the Suez Canal and the Red Sea, the shortest route to India. Britain also holds Perim, 'the Gibraltar of the Red Sea', a rocky island in the Strait of Bab-el-Mandeb, where the navigable channel is only 4 miles wide. Perim has a fair harbour and is a coaling station.

Exercises

1. Draw a map of the Nile, showing its entire course. Insert its chief tributaries, and mark in blue those which bring down the flood-waters.
2. Explain fully the rainfall figures in § 980.
3. 'Egypt is an oasis made fertile by irrigation.' Write a description of Egypt to illustrate the truth of this.
4. Describe clearly the position of Khartum, Aswan, Cairo, and Port Said. How far does the importance of each depend on its geographical position?
5. What is meant by the Cape-to-Cairo Railway? Could such a railway be built entirely through British territory?

CHAPTER VI

THE LAKE PLATEAUS OF EAST AFRICA

990. The Lake Plateaus. South of lat. 5 N. the greater part of East Africa consists of high hilly plateaus, bordered by low unhealthy coastal plains. Terraces rise to the high interior, which consists of old hard crystalline rocks, representing the oldest part of the continent. In regions of heavy rains these are thickly covered with recent deposits and are fertile, but where they form the surface rock the country is infertile. These high plateaus are crossed by the rift valleys already described (§ 905). The eastern rift, sometimes called the East African trough, contains many small brackish lakes, some of which have no outlet. Lake Rudolf, in the drier north, is the only large lake (3,000 square miles, 170 miles long), unless we include Nyasa in the eastern rift.

990a. The floor of the rift valleys is not uniform, and low heights separate the different lake basins. In the eastern rift Naivasha, a small but beautiful lake, is over 6,000 feet above the sea, while Rudolf is only 1,250 feet. Similarly, in the western rift, Tanganyika lies 2,625 feet above the sea; Kivu, 4,830 feet; Edward, 3,000 feet; and Albert, just over 2,000 feet.

991. The western rift is separated from the eastern rift by plateaus 8,000 feet high, which fall steeply to both rift valleys. The western rift contains Tanganyika (400 miles long), the longest fresh-water lake in the world, and other long lakes. Between the two rifts, filling a depression in the high plateau above, is Lake Victoria (3,720 feet, 26,000 square miles = Scotland).

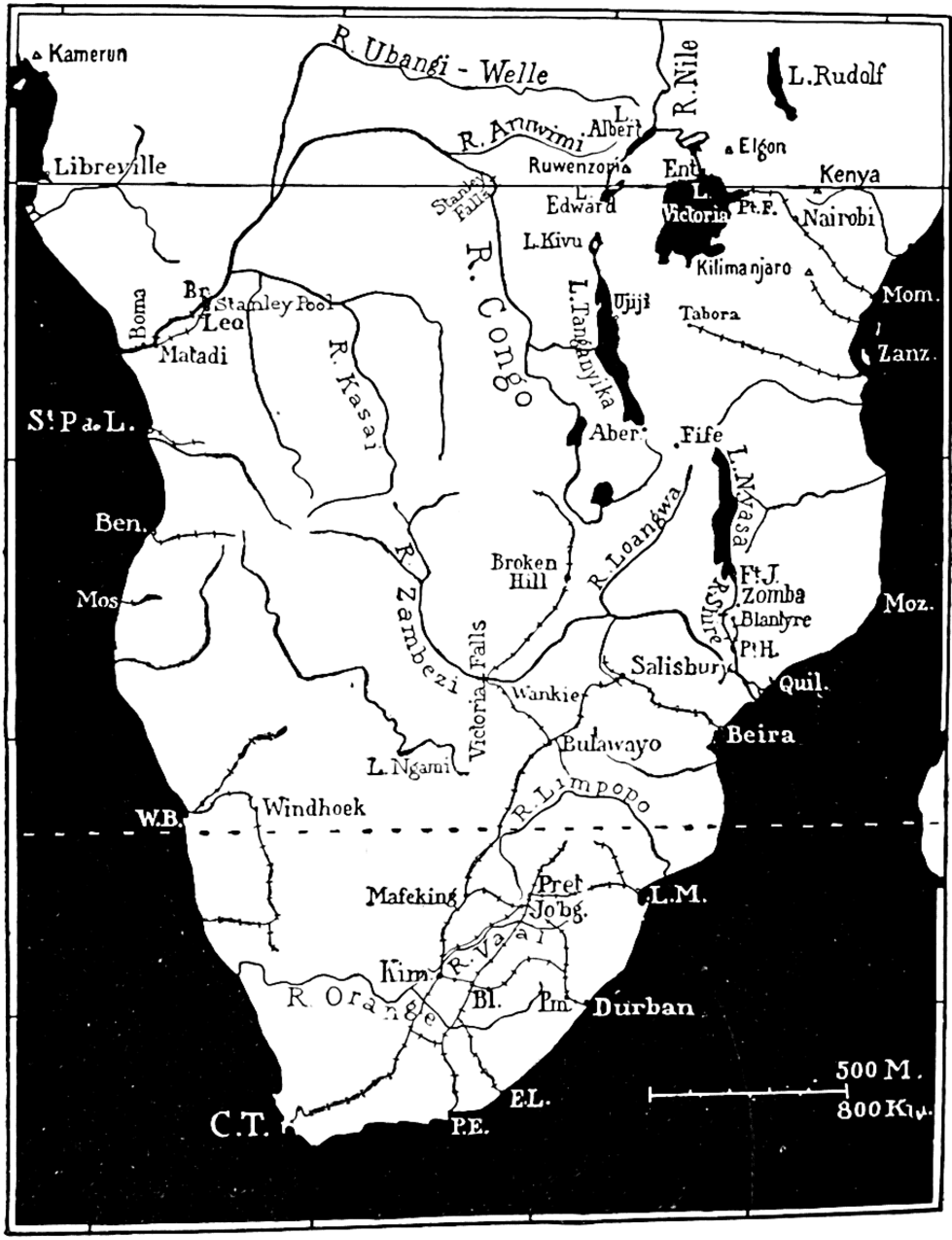


Fig. 48. Towns and Routes of Central and South Africa.

992. Many volcanoes, active and extinct, are found along these rift valleys (§ 907). Elgon (14,150 feet), and Kenya (17,000 feet), lie between Lake Victoria and Lake Rudolf. Kilimanjaro (19,320 feet), the highest peak of Africa, in German territory, also rises above the eastern rift. The Mfumbiro volcanoes (14,680 feet), still partly active, and over 700 miles from the sea, rise above the western rift between Lakes Kivu and Edward. Igneous rocks and lava-flows lie above the older rocks in these volcanic regions. A magnificent group of snow peaks, called Ruwenzori (16,000 feet) rise between Lakes Edward and Albert, and their heavy rains feed innumerable rivers, which flow to these lakes and so to the Nile. Ruwenzori is generally hidden in dense mists, and Stanley, the explorer, who later had a magnificent view, once passed within a few miles without seeing it. Ruwenzori is supposed to be the Mountains of the Moon of ancient geography, and is drained to the Semliki (§ 974).

993. The northern part of this plateau, which may be called the Plateau of the Northern Lakes, forms British East Africa and Uganda in the north and German East Africa in the south. The southern part, or Plateau of the Southern Lakes, forms Northern Rhodesia, Nyasaland, and Mozambique.

994. Climate and Products of the Northern Lake Plateau. The following table shows the temperature and rainfall at varying heights and distances from the coast :—

Place.	Latitude.	Longitude.	Height in feet.	Coldest Month.	Hottest Month.	Mean Annual Rainfall.
Mombasa	4° 4′ S.	39° 42′ E.	60	77·5 F. (July)	82·9° F. (Jan.)	48·0 in.
Machakos	1° 31′ S.	37° 18′ E.	5,400	61·3° F. (July)	67·5° F. (Jan.)	37·0 "
Entebbe .	0° 3′ S.	32° 30′ E.	3,906	70·5° F. (July)	72·7° F. (Jan.)	59·1 "

These figures show how little the temperature varies between the hottest and coldest months near the equator. The lowest temperatures are recorded at Machakos, the highest of the three stations. The rainfall at Mombasa is much heavier than at Machakos. The very heavy rainfall of Entebbe is largely due to the great evaporation from the surface of Lake Victoria and the swamp regions of Uganda.

995. British East Africa and Uganda (400,000 square miles). Lake Victoria is crossed by the equator, and both British East Africa and Uganda lie entirely in tropical latitudes. The coastal plain, which is of varying width, has a hot, wet, unhealthy climate, and produces dense tropical vegetation. The land rises by terraces to the interior. The first of these (800 feet) leads to a broad dry plain, about 50 miles wide, forming a dry scrubland. The higher plateaus have heavier rains, and the country passes into the rich savana lands of Masai Land, including the Athi plains, the home of immense herds of game, and of lions and other beasts of prey. The land rises to the rich grasslands of the Kikuyu Hills, where the temperate climate is well suited to English settlers. Nairobi, south of Kenya, and about 100 miles north of Kilimanjaro, is the capital, in a coffee-growing district. The Kikuyu escarpment (7,000 feet) falls steeply to the eastern rift valley, on the opposite side of which rises the still higher densely forested Mau escarpment (8,320 feet). This sinks to Lake Victoria in the south of Uganda. This great lake sets up a system of land and sea breezes on a great scale, and heavy gales often blow. The cool winds from the lake, together with the height, make the climate very cool for the equatorial latitudes, but the lake itself, and the rivers flowing to it, are swampy and unhealthy.

996. The coastal plain of British East Africa is fringed with mangrove swamps, and the forests produce rubber, indigo, ebony, and coco-nut palms near the sea, &c. Rice, sugar, sweet potatoes, manioc, are other crops grown by the natives. Mangrove bark is used for tanning, and the dried kernel of the coco-nut forms copra, which is made into soap, candles, lubricants, &c. The scrub belt produces little but fibre plants, including the sisal hemp and the bowstring hemp with which natives string their bows. At greater heights grain, cotton, coffee, tea, and a great variety of crops can be grown under European supervision by native labour. Similar crops are grown in Uganda, where the banana is the chief food plant. Much of Uganda is hilly country, covered where the soil is rich with elephant grass, which often reaches a height of 15 feet. The valleys and other depressions consist of papyrus swamps. Rice might be grown in many of these. The deeper valleys are filled with dense forests, in which indigo and rubber grow wild. The drier lands in the lee of the higher hills produce acacias and other dry savana trees. The mountains are densely forested up to 6,000 or 7,000 feet, and above this is a belt of giant bamboos, often 40 feet high. Still higher are tree heaths, deeply encrusted with moss and lichens, and giant groundsels and lobelias, 20 feet or more high. At still greater heights are brilliantly coloured Alpine flowers and dwarf plants.

996a. In Kikuyu the spring rains (March to May) are called the maize rains, and the autumn rains (October to December) the millet rains.

996b. The coco-nut palm in British East Africa, and the banana in Uganda, are put to many uses. Not only do they supply food and drink (for both yield abundant juice, which is made into a kind of wine), but their trunks are used to make houses, their leaves for thatch, and sometimes for articles of dress, while their fibres are worked into twine, cloth, &c. The coco-nut shell is made into vessels and ladles.

997. The Uganda Railway (600 miles long) was built a few years ago from Mombasa, on an island off the coast, to Port Florence on Lake Victoria. It was a costly undertaking, owing to the height to which it had to be carried, the dangers from diseases and wild animals, the difficulty and expense of procuring and feeding a sufficient army of labourers, the risks from landslides and floods, the innumerable streams and ravines which had to be bridged, &c. Sometimes the labourers were eaten by lions, and sometimes the wooden sleepers were eaten by white ants. The railway has led to a great increase in settlement, in freight traffic, in trade, and even in tourist traffic.

997a. The banana is the chief food plant, but fish, caught in the lake, is also much eaten. Boat-building is an important art, and the largest canoes, which carry several hundred persons, are beautifully made, without nails, by sewing or lashing the parts together. Uganda bark cloth, made by beating out the bark of a species of fig, once the common native dress, is now replaced by European clothes. Different tribes have different occupations, and the Bahima, who keep cattle, look down on the Baganda, who till the ground.

998. German East Africa has a coast-line of about 600 miles on the Indian Ocean, which is bordered by a hot unhealthy plain. The following figures show the observations at typical stations:—

Place.	Latitude.	Longitude.	Height in feet.	Coldest. Month.	Hottest Month.	Mean Annual Rainfall.
Dar-es-Salaam	6° 45′ S	39° 20′ E.	46	73·8° F. (July Aug.)	81·7° F. (Jan.)	45·6 in.
Kwai	4° 45′ S.	38° 18′ E.	5,280	56·7° F. (July)	66·7° F. (Jan.)	30·8 „
Tabora . .	5° 3′ S.	32° 33′ E.	4,035	70·2° F. (June)	71·4° F. (Jan.)	26·6 „

Here, in somewhat higher latitudes, the rainfall decreases from the ocean to the interior, for there is no great inland lake to cause much evaporation. The heaviest rainfall is on the east coast, where the trade winds blow during part of the year.

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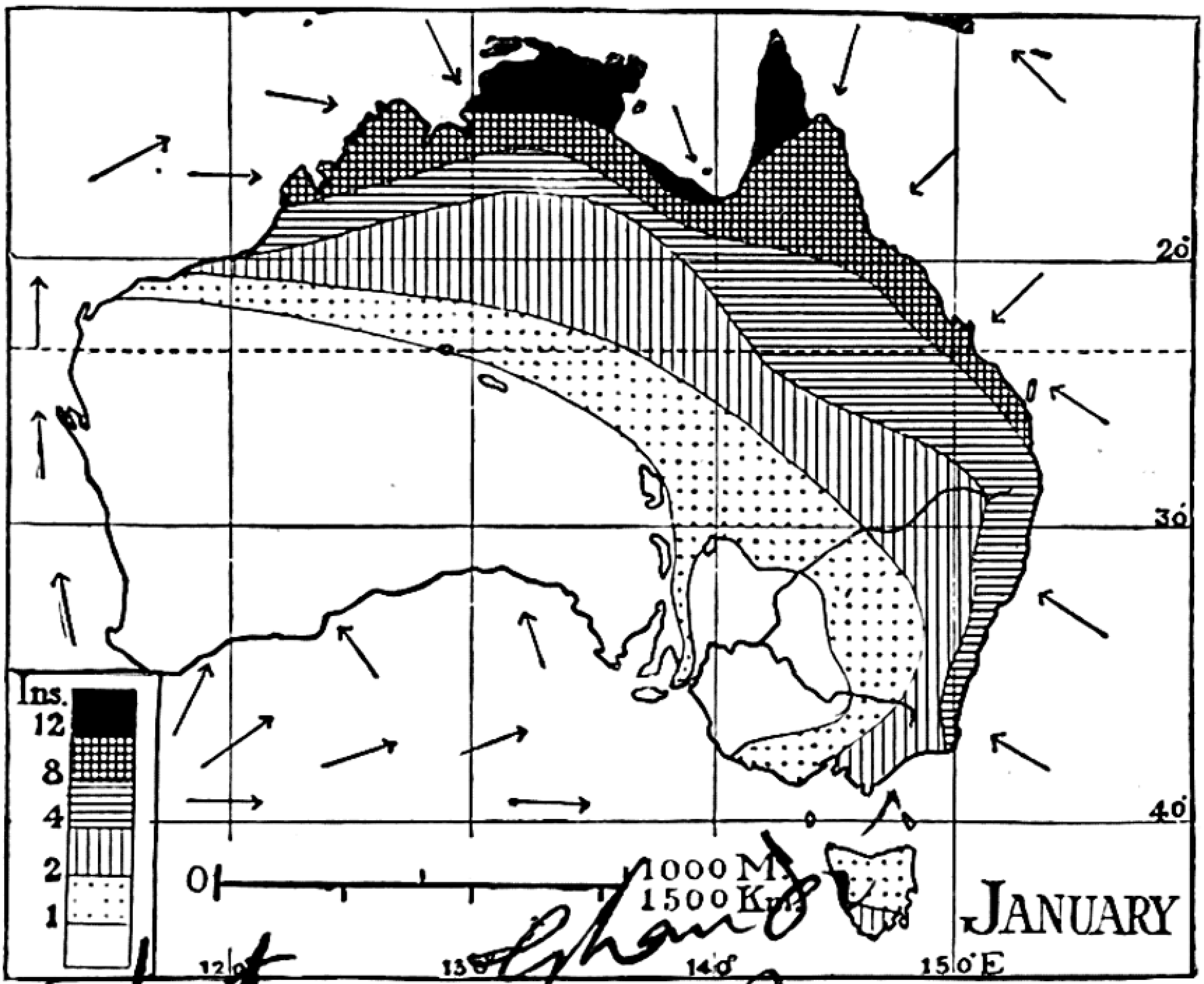
CHAPTER X

CLIMATE, PLANTS, ANIMALS, AND MAN

1061. Climate. Australia lies between lat. 10° 39′ S. and lat. 39° 12′ S., in the latitude of South Africa, and in latitudes corresponding to those of Africa north of the Gulf of Guinea, in the northern hemisphere. It resembles both North and South Africa in climate, if allowance is made for differences in the height and breadth of the land. In both continents the highest land is along the east coast, exposed to the trade winds, the prevailing winds in these latitudes.

Place.	Latitude.	Longitude.	Height in feet.	July Temperature.	January Temperature.	Mean Annual Rainfall.
Cape York .	10° 44′ S.	142° 36′ E.	20	76.1° F. (Aug.)	81·7° F. (Dec.)	82·0 in.
Port Darwin .	12° 28′ S.	130° 51′ E.	20	74.7° F.	84·4° F. (Nov.)	62·4 „
Brisbane . .	27° 27′ S.	153° 0′ E.	45	57·2° F.	76·1° F.	40·8 in.
Bourke . . .	30° 3′ S.	145° 58′ E.	140	51·4° F.	84·2° F.	15·3 „
Sydney . . .	33° 51′ S.	151° 11′ E.	45	48·7° F.	71·4° F.	48·3 „
Melbourne .	37° 50′ S.	144° 59′ E.	30	48·7° F.	67·5° F.	25·5 „
Hobart Town	42° 53′ S.	147° 20′ E.	50	45·7° F.	62·0° F.	22·3 „
Adelaide . .	34° 56′ S.	138° 35′ E.	45	51·6° F.	74·1° F.	20·3 „
Geraldton . .	28° 46′ S.	114° 36′ E.	5	58·6° F.	76·8° F. (Feb.)	17·7 in.
Perth . . .	31° 57′ S.	115° 52′ E.	15	55·0° F.	75·7° F.	33·3 „
Coolgardie .	30° 57′ S.	121° 10′ E.	425	51·4° F.	77·5° F.	9·0 „

1062. New Guinea lies between the equator and lat. 11° S., in the equatorial hot wet belt. The northern part of Eastern Australia receives heavy summer rains from inflowing monsoon winds from the Indian Ocean, and winter rains from the south-east trades, which then follow the sun northwards. The summer rains are far the heavier. Observations made during thirty-five years at Port Darwin show that over 15 inches of rain, or a quarter of the total rainfall, fall there in January,



Mahatma Ghandi

Fig. [illegible] Rainfall of Australia in January.

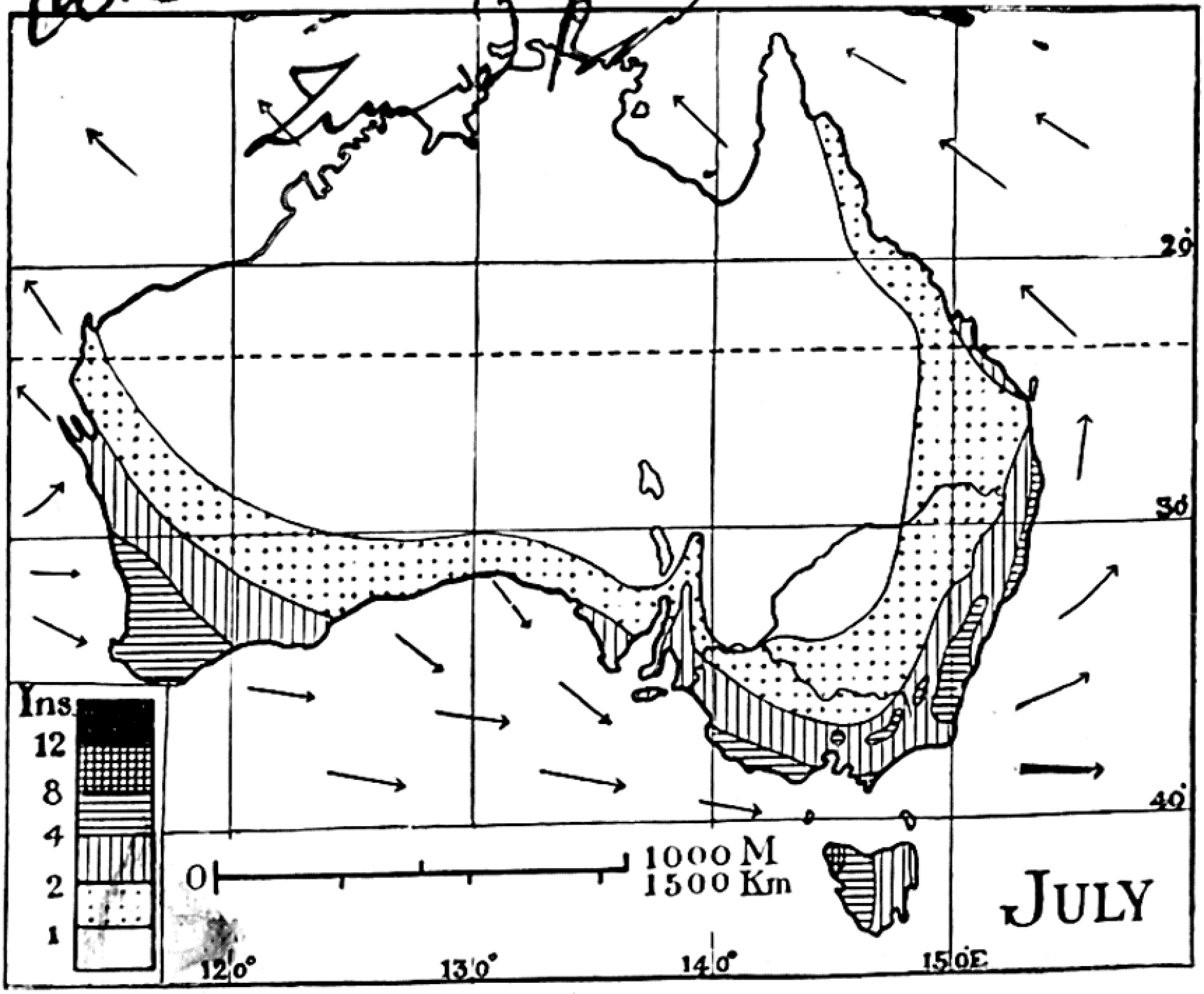


Fig. 62. Rainfall of Australia in July

when the Sun is vertical at the Tropic of Capricorn. The coastal plains of Queensland have also rains at all seasons, but most in summer. Farther south, Australia is in the belt of the south-east trade winds, which bring rain to the eastern slopes of the Eastern Highlands and pass on as dry winds. Notice how small the rainfall is at Bourke, in the lee of the Eastern Highlands, and compare the rainfall of Geraldton on the west coast with that of Brisbane, in almost the same latitude, on the east coast. Coolgardie, on the western edge of the dry interior, is much drier than Bourke, on the eastern edge in the same latitude. The extreme south of Australia has winter rains brought by the prevailing westerlies, which do not blow north of lat. 40° S. in summer, but follow the Sun north in winter. In the south of the continent the west becomes the windward and the east the lee side, and where the west coast is high the difference between the rainfall of east and west becomes very marked. This explains the small rainfall of Hobart Town in Tasmania, which is in the lee of the wet winds.

1063. West of lat. 135° W. most of Australia is a rainless desert, and rain falls only at long intervals in sudden violent storms. We should know little of its rainfall but for observations made along the Overland Telegraph, which crosses Australia from Port Darwin to Adelaide. The figures are given below and explain themselves.

Place.	Latitude.	Longitude.	Height in feet.	Mean Annual Rainfall.
Port Darwin	12° 28′ S.	130° 51′ E.	20	62·4 inches.
Katherine River	14° 5′ S.	132° 3′ E.	—	40·3 ,,
Daly Waters	16° 6′ S.	133° 23′ E.	—	27·7 ,,
Barrow Creek	21° 6′ S.	133° 8′ E.	—	13·0 ,,
Alice Springs	23° 38′ S.	133° 37′ E.	587	10·8 ,,
Charlotte Waters	25° 9′ S.	134° 8′ E.	—	5·6 ,,
Strangeways Springs	29° 38′ S.	137° 20′ E.	60	5·6 ,,
Adelaide	34° 56′ S.	138° 35′ E.	45	20·3 ,,

1064. All these facts are summarized in the rainfall maps in Figs. 59–62. These show which parts of the continent have rains in summer (January), which in winter (July), which at more than one season, and which are dry all the year round. As we should expect in these tropical and sub-tropical latitudes, the dry area is largest in winter and smallest in summer.

1065. The isothermal maps show how the temperature would be distributed if the whole continent were at sea-level, but do not necessarily explain the figures for any given station. The temperature is equable and highest in northern tropical Australia, and equable and lowest in the south. In the interior, as in all deserts, there are great variations between the seasons and between day and night. Alice Springs, the central station on the Overland Telegraph, has a mean annual temperature of 70° F.

1065 a. As weather observations accumulate, it is found that there are weather cycles in most countries. At present (1913), in Britain we are passing through a cycle of years with more wet than dry summers, and more mild than severe winters. In Australia, a cycle of dry years is following a cycle of wet years, when pasture and sheep-farming expanded. Wild animals, which move about more freely than domesticated stock, would have left the drier areas before they were eaten bare, and a cycle of good years would have renewed their vegetation. The last cycle of dry years caused the death of millions of stock in the drier scrublands, and rabbits ate off whatever plants remained. It is doubtful if these drier scrublands will ever again produce sufficient pasture for stock.

1066. Plants. Fig. 63 shows the vegetation belts, and should be compared with the climate maps. Hot wet forests cover New Guinea and the coasts of the monsoon lands, and savanas are found where dry and wet seasons alternate. Mediterranean forests occur in the south of Western Australia and Victoria, but most of the continent is poor steppe, scrub, or desert.

1067. When Australia was discovered the tropical lowlands were densely forested with palms, bread-fruit, bananas, cedars, tree-ferns, pineapple, &c., and indigo, ginger, pepper, nutmeg, and spices grew wild. In the savanas was found an Australian baobab, like that of Africa, but smaller. The commonest tree is the eucalyptus, or gum tree, which has small dry leathery leaves and a compact shape. It secretes a strong oil, drops its leaves edgeways to prevent the sun from shining fully on the evaporating surface, and develops its roots and branches rather than its foliage. In these ways it adapts

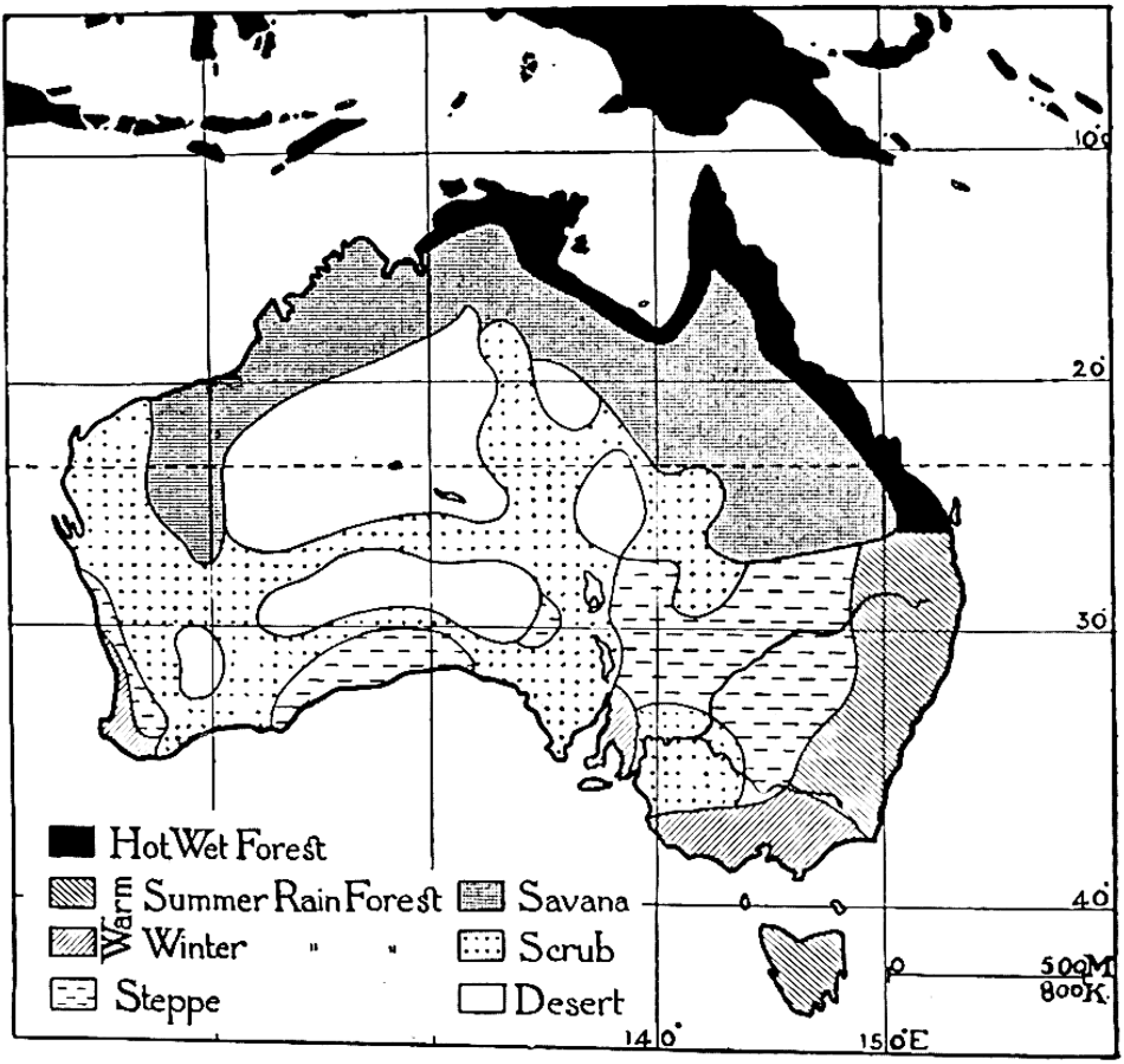


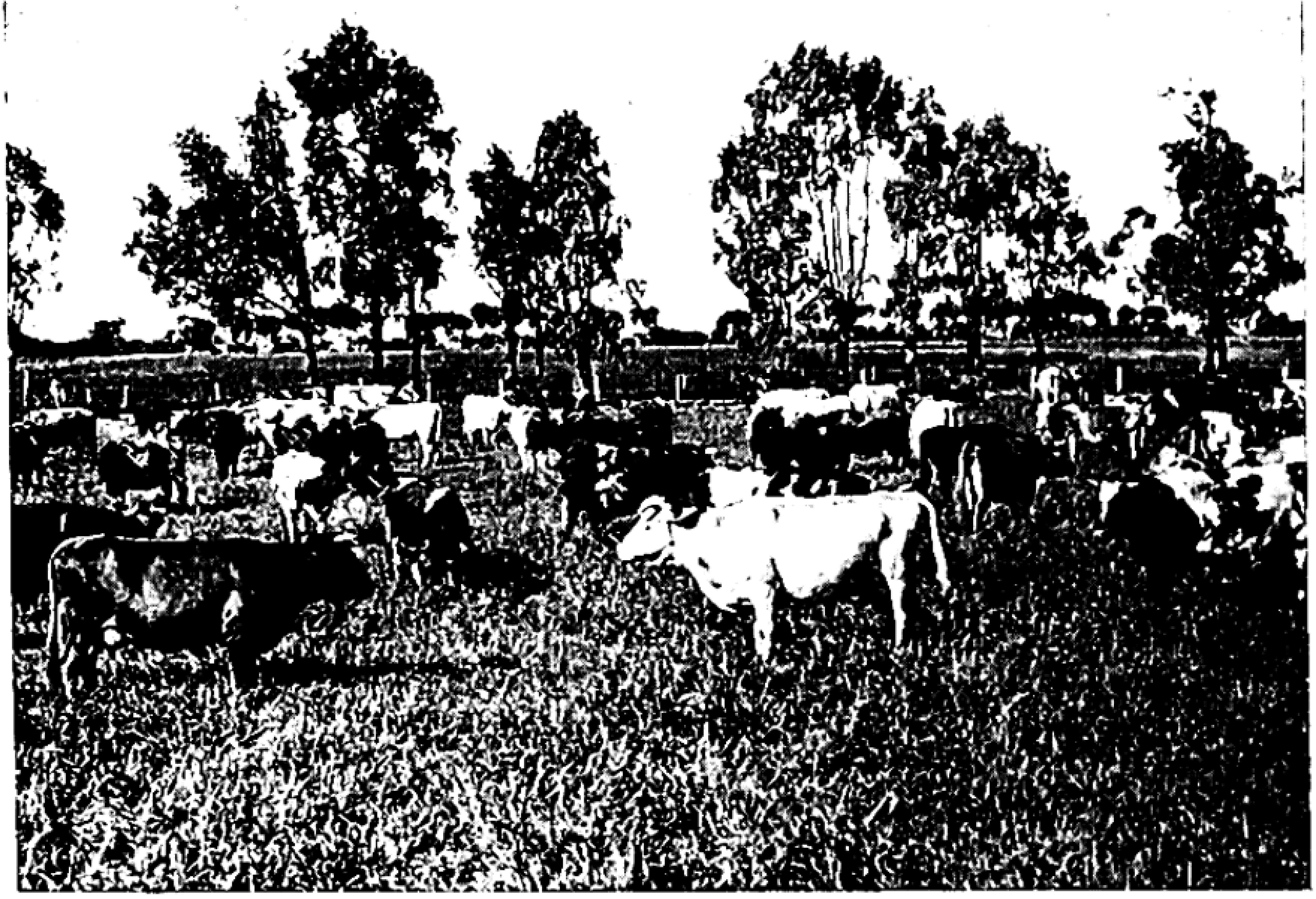
Fig. 63. Natural Vegetation of Australia.

itself to a dry climate, and has been introduced both into North and South Africa. In the wetter parts of Australia some giant species, e.g. the karri and jarrah of West Australia, reach 300 or 400 feet and yield indestructible timber, which is used all over the world for street-paving, piers, dock gates, &c. Giant eucalyptus also grow in the Mediterranean forests of Victoria. The acacia, or wattle, a tree with yellow flowers, not unlike a mimosa, is common, and is the national emblem.

1068. The richest savanas of Australia lie west of the Eastern Highlands, and form the Downs of Queensland and New South Wales. They support no large herds of wild game, like the African savanas, but make excellent pasture land. Much of this region has now been transformed into irrigated agricultural land.

1069. The scrub plants of Australia are hard, thorny, and dry. Mallee, a dwarf eucalyptus, covers thousands of square miles in Victoria and the south of South Australia. Brigalow scrub is a dwarf acacia, which is almost impenetrable. The mulga is a low bush, with sharp spines, and the still more dreaded spinifex has leaves not unlike a bayonet, which inflict dreadful wounds. Some of these are valued by the natives as water-storing plants, but are useless for pasture. The only valuable scrub plant is the salt-bush, which is greedily eaten by sheep. It can resist long drought, and is abundant after the last blade of grass has withered.

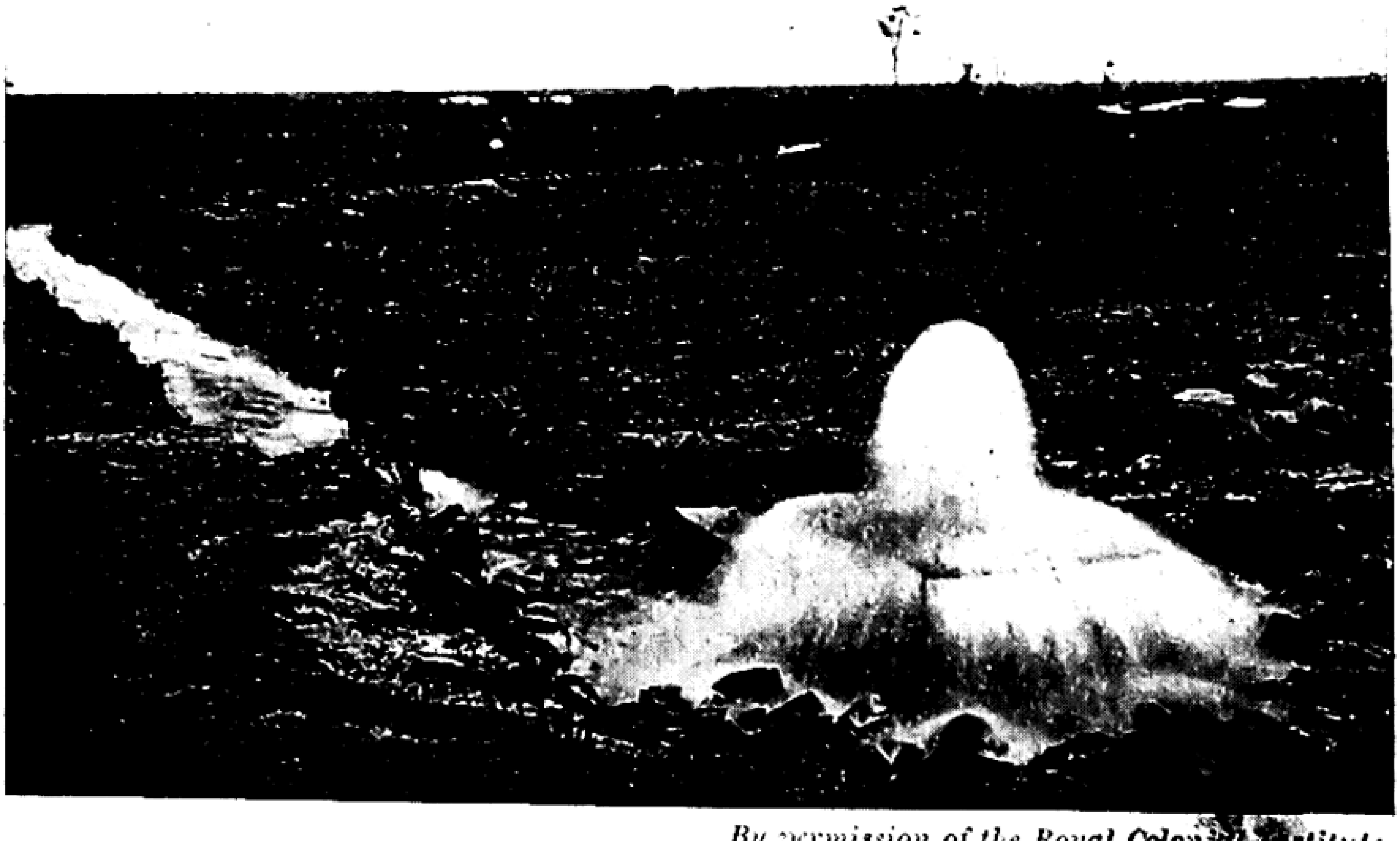
1070. Cultivated Plants. The tropical plains of North-east Queensland have been cleared, and brought under cultivation. Sugar is the chief crop, and is largely grown on the river bottoms. Labour, however, is scarce, for the heat is too great for white men, and Australia is



By permission of the South Australian Government.

Fig. 64. Eucalyptus Trees.

Notice the eucalyptus trees in the background, and the absence of bushiness in their shape. They give much less shade than most English trees.



By permission of the Royal Colonial Institute.

Fig. 65. An Artesian Well.

Notice how the water is forced up and flows away across the scrub land.

opposed to coloured labour. For this reason the plains of the north coast are little settled or cultivated. In the savanas stock-raising is important, and fruit and wheat are grown on the Downs. The Riverina district of New South Wales is very fertile, and the irrigated area is to be increased by building a dam 200 feet high to hold back the flood-waters of the Murrumbidgee. The Mildura region, at the confluence of the Murray and Darling, is an irrigated fruit-growing region. Fine wheat is grown in Victoria and South Australia, where the warm dry summers bring suitable varieties to perfection. The vine is grown in the Mediterranean belt of Victoria and South Australia, and wine is exported.

1071. Animals. When Australia was first explored by white men, at the end of the eighteenth century, it contained no animals familiar to us, and many which no longer exist elsewhere. The largest of these, the kangaroo, has long hind legs, short front ones, and a long strong tail, which allows it to stand erect and leap great distances. The kangaroo produces very helpless young, and carries them in skin pouches. Wallabies, opossums, and many other native animals are also pouched animals or marsupials. The duck-billed mole, or platypus, lays eggs, but suckles the young ones when hatched, and among other strange creatures was a fish which had lungs instead of gills. The birds included the crested cockatoo, and the lyre bird with its exquisite lyre-shaped tail. The wingless emu, a running bird, found in the savanas, is a relative of the African ostrich. No horses, oxen, sheep, or similar domestic animals, no elephants, antelopes, or other savana animals, nor any familiar beasts of prey were found. Australia had early been cut off from the rest of the world, and contained only animals which had long been extinct elsewhere.

Some of these occur as fossils in the older rocks of other lands, for in the far-distant past a land bridge united Australia to Asia. When this sank, leaving fragments unsubmerged in the islands of the Eastern Indian Archipelago, the stronger new animals which developed in the Old World, and exterminated the earlier types, had no means of reaching Australia, which remained a natural zoological museum until the coming of man.

1072. The climate of Australia suits most European animals, and when introduced they multiplied at the expense of the weaker native animals. About 90,000,000 sheep now feed on pastures once occupied by the kangaroo, and are bred both for wool and mutton in the drier savanas and in the saltbush country. They are most numerous in New South Wales. The wetter savanas suit cattle and horses, but the better pastures are used for dairy-farming, which is becoming very important, especially in Queensland. Butter, frozen meat, hides, tallow, and glue are other pastoral exports.

1072 a. Perishable cargoes, e.g. meat, butter, have to be sent in special refrigerating chambers or they would go bad on the long voyage through tropical latitudes.

1073. Man has also introduced vermin. The sheep, which has ousted the kangaroo from the pasture lands, is in turn threatened by the rabbit. Thousands of miles of rabbit-proof netting have been put up round the sheep runs, at a cost of several million pounds, and rabbit-trapping pays so well that farm labour can hardly be had during the season. Frozen rabbits are exported, and the skins sent to Britain to be made up into imitations of costly furs, which are less abundant than they were in the cold temperate forests.

1074. Man. The Australian aborigines belong to a primitive type, and are short, dark, and hairy. They live by hunting and gathering edible roots, and when discovered used stone axes like those of early man in Britain and elsewhere. Their only domesticated animal was the dingo, or native dog, and the absence of animals partly explains their backward condition. They are not without ingenuity, and their well-known weapon, the boomerang, is shaped in such a way that it returns to the hand of the thrower. The survivors are now found chiefly on the margin of the desert, where they live like the Bushmen of the Kalahari desert, eating any kind of animal food, and obtaining water from water-storing plants. The aborigines of Tasmania are extinct.

1075. The first industry introduced by white settlers was sheep-farming, for which Australia is as well suited as South Africa (§ 1035). Until 1850 Australia was almost entirely pastoral, though some wheat was grown in South Australia. Butter was first exported in 1890. The discovery of gold in the 'fifties' of last century attracted many settlers, and gold ranks next to wool among exports. Great attention is paid to agriculture, and wheat is now third on the list of exports. Coal is abundant, and manufactures are beginning to develop.

Exercises

1. Write a short account of the climate of Australia.
2. Draw a map of the natural vegetation belts of Australia, and write a short description of each.
3. How do Australian plants protect themselves against the dryness of the climate?
4. What occupations are most important in Australia? Compare them with those of South Africa, and explain any resemblances.

CHAPTER XI

THE COMMONWEALTH OF AUSTRALIA

1076. The Commonwealth States. The Commonwealth of Australia, formed in 1901, consists of West Australia (975,000 square miles), Queensland (670,000 square miles), South Australia (380,000 square miles), New South Wales (310,000 square miles), Victoria (88,000 square miles), and Tasmania (26,000 miles). Northern Territory (523,000 square miles), and Papua, or British New Guinea, are controlled by the Federal Government.

1077. New Guinea. New Guinea is a forested island, with mountains 13,000 feet high. Lying in equatorial latitudes it has a hot climate and a very heavy rainfall. Tropical forests cover the lowlands and the mountain slopes up to 5,000 or 6,000 feet, with bamboo thickets and grasslands above, but most of it is unexplored. The coastal natives grow coco-nut and sago palms, bananas and yams, keep pigs, the chief domesticated animal, and fish for pearls, pearl-shell, turtle and trepang (a sea slug used in China as a table delicacy). New Guinea is rich in minerals, including gold, but these are little worked. Plantations of rubber, vanilla, sugar, &c., are being made under European supervision, but labour is scarce. The western half is Dutch and the eastern half is German in the north and British in the south. Port Moresby, the largest settlement in Papua, trades in sandal-wood, ebony, rubber, copra, and other tropical produce.

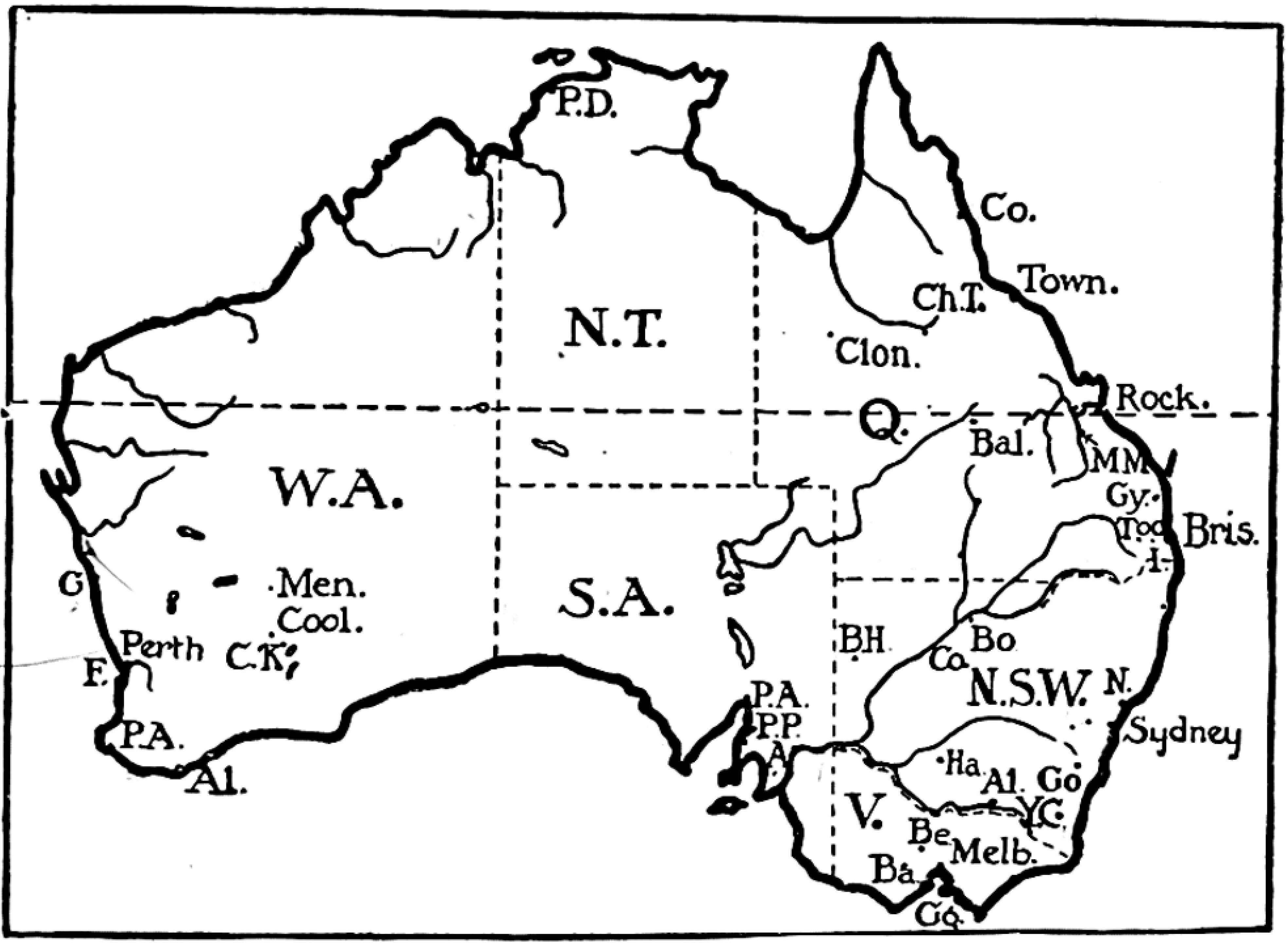


Fig. 66. Political Divisions and Towns of Australia.

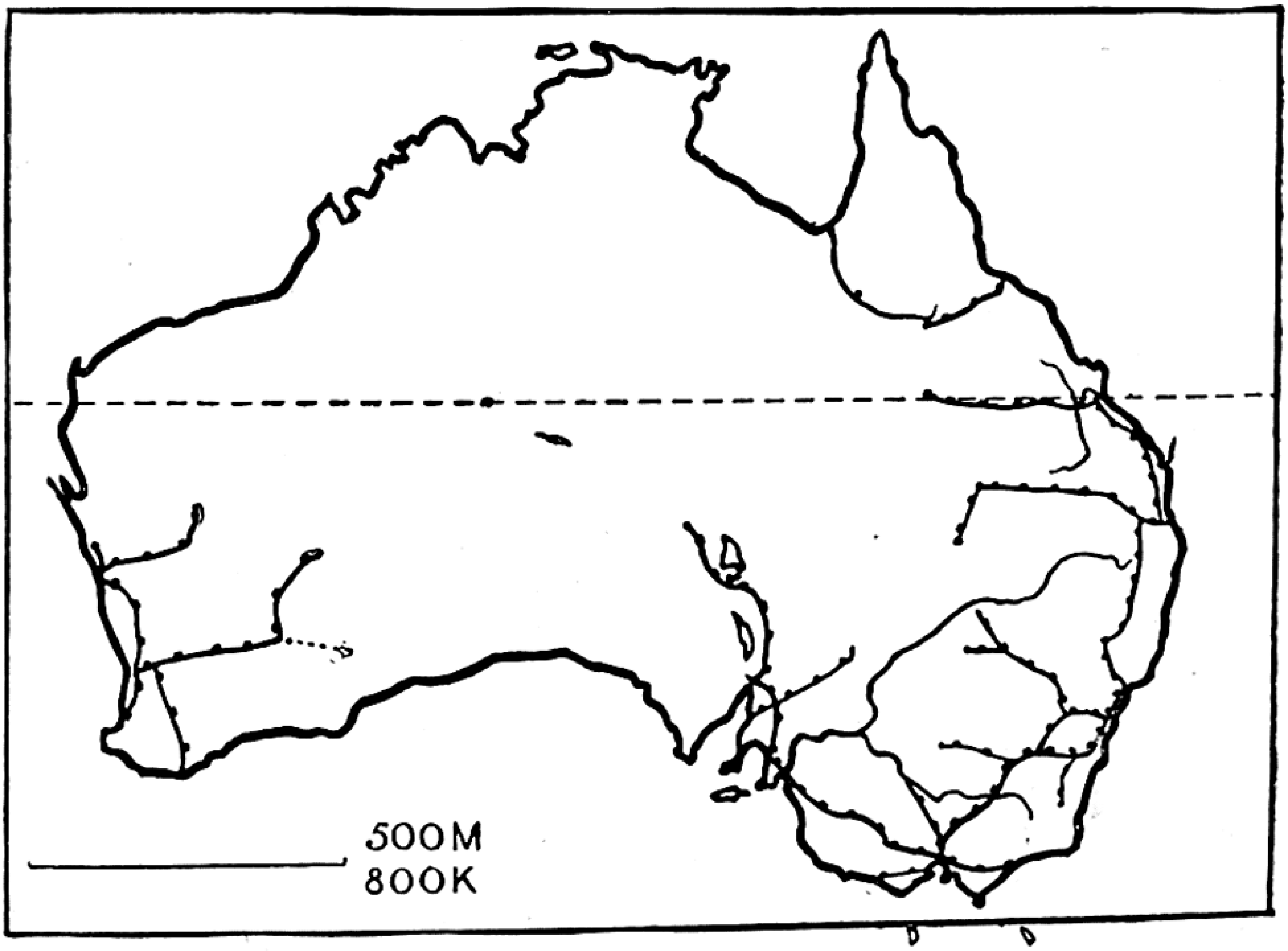


Fig. 67. Railways of Australia.

1078. Queensland. Queensland is almost bisected by the Tropic of Capricorn, but owing to its configuration most of the State is outside the tropics. The north receives heavy monsoon rains, and has a hot wet climate not well suited for white settlers. Queensland consists of three natural regions: (i) the eastern coastal plain, 30 to 100 miles broad, crossed by the lower valleys and estuaries of rivers from the eastern slopes of (ii) the Queensland Highlands, which run southwards through the colony, and (iii) the Queensland Downs and Plains, a savana region west of the main ranges, sinking in the west through scrub to desert.

1079. Each natural region has its own resources and occupation. The rivers which descend from the highlands have covered the coastal plain with a deep, rich, alluvial soil, in which all tropical crops can be grown. When settlement began they were densely forested, and large forests still remain, especially in the higher valleys and in the hotter north. The Moreton Bay pine, the cedar and other timber trees were abundant, the rivers supplied power for many saw-mills, and clearing was quick and profitable. Sugar, rice, bananas, pine-apples, and other tropical fruits are now grown in the alluvial plains, coffee and cotton on the foothills of the highlands, and maize still higher.

1080. The Queensland Highlands produce fine timber and are rich in gold, copper, tin, coal, and other minerals. Mount Morgan, near the Fitzroy River, and Charters Towers, near the Burdekin, are famous goldfields. Opals are also found.

1081. The Queensland Downs are mainly pastoral, feeding millions of sheep and cattle, and producing wool, mutton, hides, butter, and other pastoral produce, which are sent by rail across the highlands to the coastal ports. In the Darling Downs, round the Condamine River, which have a fertile volcanic soil, vines and wheat are grown under irrigation round Toowoomba. Warwick, near the source of the Condamine, is one of many growing farming centres. These are connected by rail with Sydney in New South Wales, as well as with the Queensland ports.

1082. The scrublands of Western Queensland are dry and drained to Lake Eyre by the Diamantina, Barcoo, and other rivers, which carry water only after rain. Many deep wells have been sunk to increase the sheep-farming area and water the herds which use the great stock route connecting Western Queensland with the ports of South Australia.

1083. The population of Queensland is small for its area and resources (650,000 people), but will grow rapidly. The towns are nearly all on the coast, where broad valleys open easy routes into the highlands and allow the produce of the interior to be brought down cheaply to the estuary ports. North of Rockhampton they are sheltered by the Great Barrier Reef. Brisbane, the capital and chief port, on the Brisbane River, at the head of navigation, 25 miles from Moreton Bay, is the terminus of a line which runs to the Ipswich coalfield, on which cotton and wool are manufactured, and crosses the highlands to Toowoomba. Maryborough is the outlet for the agricultural, forest, and mining industries of the Burnett valley. Rockhampton, on the southern tropic, commands easy routes to the highlands by the Fitzroy and Mackenzie Rivers, in which many little towns have sprung up. A line follows the Fitzroy valley to the Mount Morgan gold mines, and is continued across the highlands to the Upper Barcoo. Rockhampton, like Brisbane, exports the produce of all three regions,—the wool and meat of the Downs, the gold of the highlands, and the cattle, dairy, and agricultural produce of the Fitzroy valley. Mackay, 600 miles north of Brisbane, the terminus of a short line through the sugar districts, exports sugar, copra, coffee, and tropical fruits. From Townsville, nearly 900 miles north of Brisbane, a line runs by Charters Towers across the highlands to the Diamantina. Townsville exports sugar from the Burdekin district, gold from Charters Towers, and copper from Cloncurry. Cairns ships the tin mined at Herberton, gold, and tropical produce.

1084. Sheep-farming and dairy-farming are the occupation of two-thirds of the colony and supply the most valuable exports. Minerals rank third, with gold leading, and agricultural produce comes next.

1084 a. Pearl, turtle, sponge, coral, and other tropical fisheries are important along the north coast, where Thursday Island, off Cape York, has a fortified coaling station on a good harbour.

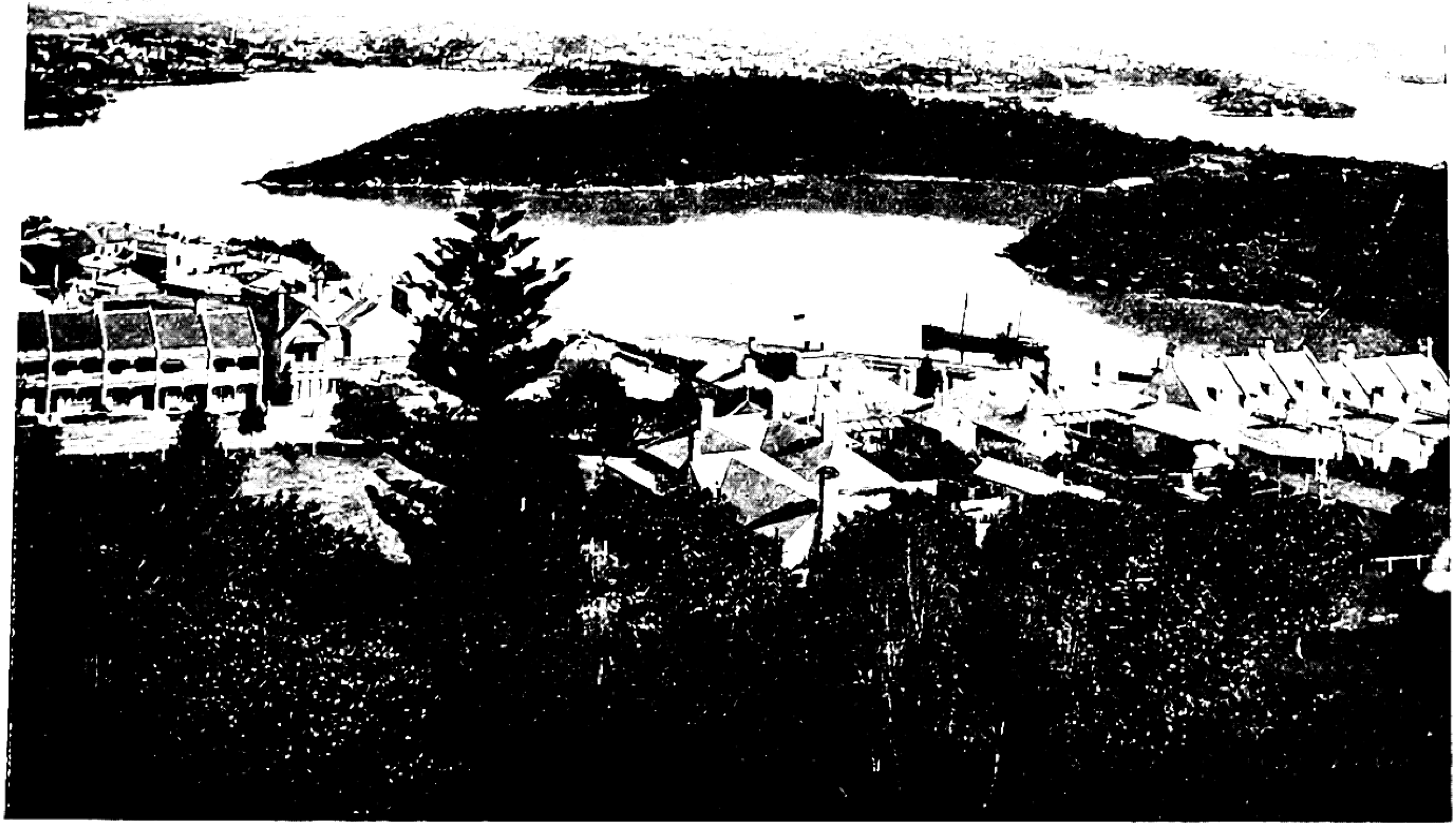
1085. New South Wales. New South Wales, with 1,500,000 people, has the largest though not the densest population of any State (5 per square mile). The natural regions are the same as in Queensland: (i) the coastal plain, engaged in agriculture, dairy-farming, coal-mining, and some manufactures in the Hunter valley; (ii) the highlands, producing timber, minerals, and pasture; and (iii) the Western Downs, which are pastoral and agricultural. New South Wales, outside the tropics, has a smaller rainfall than Queensland, and there is a marked difference between the wet east, exposed to the trade winds, and the dry west, which is sheltered.

1086. The coastal plain is narrow, and the agricultural products, which vary with the latitude, include sugar, bananas, &c., in the north; maize, tobacco, and oranges in the centre; and meadow grasses, wheat, and temperate crops in the south.

1087. The highlands rise by steep escarpments above the coastal plain, and there are few good routes across them to the Murray Darling basin. The lower slopes are forested with gum trees, and the valleys produce coal and gold. The Hunter coalfield is the richest in the southern hemisphere. Gold is abundant round Bathurst and Goulburn in the Blue Mountains, and silver lead in the Stanley Ranges, where the rich silver-lead mines of Broken Hill also yield zinc. These western mines are 900 miles distant from Sydney across the highlands, and their output goes to Adelaide.

1088. The Western Downs pass from a savana, dotted with clumps of gum trees, and fit for either agriculture or pasture, into dry scrub, irrigated by deep wells, in the west. Wheat and fruit are grown under irrigation in the Riverina district, which is drained by the Upper Lachlan and the Murrumbidgee to the Darling.

1089. Sydney, the oldest town in Australia, on a magnificent island-studded, almost land-locked, bay, with a deep-water front of over 100 miles, is the capital and chief port. It contains more than half a million people, or one-eighth of the population of Australia. Fruit is largely grown in the neighbourhood. Sydney is on a deep coalfield which extends below the sea, and mines have been sunk to seams which lie 3,000 feet deep. Pastoral products, especially wool, and gold are the most important exports. Sydney is joined by railways along the coastal plain to Newcastle, the coal port on the north, and to Illawarra in a dairy-farming country to the south, but the most important lines run inland across the highlands. One climbs the escarpment of the Blue Mountains behind Sydney, and runs by the Bathurst goldfield and the fertile Upper Macquarie valley to Bourke at the head of the Darling navigation,



Photograph by W[illegible] Bros.

Fig. 68. Sydney Harbour.

sending off a branch to the Cobar copper mines. The main line to Melbourne makes a longer and more gradual ascent to Goulburn, sends branches to the more important farming and mining centres, crosses the Murray at Albury, where the river is navigable in good years, and enters Victoria. The second largest town is Newcastle, 100 miles north of Sydney, the port of the Hunter River, and the outlet for its coal mines. An important line runs up the Hunter valley, crosses the highlands, and reaches Brisbane through Toowoomba.

1090. In March, 1913, the capital of the Commonwealth was founded in federal territory which was formerly part of New South Wales. It received the name of Canberra.

1091. Victoria. Victoria, the smallest and most rugged State on the mainland, with the densest population (1,350,000, or 15 per square mile), and the largest area of cultivated land (7,000 square miles), is separated from New South Wales by the Murray. A northern agricultural region, partly drained to the Murray, is cut off from the southern rift valley by the Australian Alps and their western continuation. Beyond the rift valley rise the mountains of the Otway Peninsula and of Southern Gippsland, between which is Port Phillip, the finest of many good harbours. The Australian Alps exceed 6,000 feet, and their snows feed the Murray, which never runs dry. Their lower slopes, like those of the Gippsland Mountains, are forested. Old volcanoes are found in the west of the highlands, and their eruptions brought to the surface the rich gold-bearing reefs of quartz which are worked at Ballarat and Bendigo. Their old lava-flows have weathered to a fine volcanic soil of great fertility.

1092. The highlands of Victoria are drained south by short rivers to the sea, and the northern slopes to the

Murray in the east. West of about longitude 145° E. the rivers do not reach the Murray in the dry districts of Wimmera, covered with dense mallee scrub.

1093. The pastoral industries (sheep and dairy-farming), gold-mining, and agriculture are all important. The highlands separate the two chief farming districts. In the north-east, round Mildura, which is irrigated from the Murray, the vine, fig, peach, apricot, and other fruits are grown. The Wimmera region is being cleared, at great expense, of mallee scrub, irrigated from the rivers, across which dams are built, and planted with wheat, for which the warm dry climate is well suited. Flour equal to Hungarian flour is milled from it and exported. The vine is grown on the northern slopes, and wine and dried fruit are exported. Victoria produces the finest merino wool in the world. Dairy-farming now pays so well that the great sheep runs of early days are cut up into small dairy farms in the wetter districts, the forests of the Gippsland hills are being cleared to give more pasture, and the moister and more nutritious grasses of Europe have been introduced in place of the drier native grasses. The milk is collected and manufactured by co-operative dairies, and much butter is exported.

1094. Melbourne, the capital, on the Yarra Yarra, at the head of Port Phillip, almost in the centre of the colony, is the centre of all the routes and railways, which are very numerous. It is a fine city, with manufactures and an immense trade, and contains over half a million people. Geelong, the second port, exports the wheat and wool of the western plains. Ballarat and Bendigo have rich gold mines. A network of lines run from the coast across the highlands to many growing farming centres in the northern plains.

1095. Tasmania. Tasmania, separated from Victoria by the shallow Bass Strait, is a southern continuation of the Eastern Highlands, mountainous, and rich in gold, silver, tin, copper, and other minerals. Lying in the track of the west wind of the 'Roaring Forties', it is wet and heavily forested in the west, but drier and barer in the east. Its rugged plateaus, 3,000 to 4,000 feet high, lakes and mountain streams, recall the scenery of Scotland, and the mild climate that of Northern France. The narrow but fertile river valleys are planted with apple orchards, and Tasmanian apples are on sale in this country soon after Christmas. The forested mountains yield large timber and cabinet woods, and the drier slopes pasture cattle, sheep, and horses. The chief settlements are on the estuaries of the largest rivers: Hobart on the Derwent in the south, and Launceston on the Tamar in the north, the nearest port to Melbourne. These two rivers, flowing in opposite directions, have cut out a great central valley, followed by a railway. Hobart, the capital, has flour mills, jam factories, and iron foundries.

1096. South Australia. South Australia, a large thinly-peopled State, consists of (i) the high tableland in the west; (ii) the rift valley east of it formed by Lake Torrens and the plains round Spencer Gulf, which is its submerged lower end; and (iii) the South Australian Highlands in the east, which fall steeply to the rift valley, to Lake Eyre in the north, and to the Murray-Darling valley in the east. The south has a Mediterranean climate with scanty winter rains, and is well suited to the vine, which is planted on the northern slopes, and to wheat, which is grown in the southern peninsulas. The vine is also grown round Renmark, which is irrigated from the Murray. Farther inland the rainfall diminishes and the country is a poor scrub-land, fit for sheep in places, and passing into desert, where the only white settlements are the stations on the Overland Telegraph. Minerals are not abundant, but gold may exist in the desert. Coal and iron exist but are not yet worked, but there are copper mines east of Spencer Gulf. Settlement is confined to the region round Spencer and St. Vincent Gulfs, which give access to the best parts of the State. Adelaide, the capital, finely placed between the South Australian Highlands and the sea, contains (with its two ports) half the population of the State, which is under half a million. It is connected by rail with Melbourne, and a line runs north through dry country to Oodnadatta, nearly 700 miles inland, and will form part of a projected transcontinental line. Port Augusta, on Spencer Gulf, exports wheat, and Port Pirie, farther south, smelts and exports ores from Broken Hill in New South Wales.

1096a. Northern Territory contains little more than 3,000 people, or about 1 per 150 square miles. Small settlements exist on the northern coast, which has a tropical climate and monsoon rains. The capital is Port Darwin or Palmerston, on a fine harbour, the terminus of the Overland Telegraph and of the projected overland railway. The centre is a desert, with a few areas of scrub fitted for sheep, and some gold in the Macdonnell Ranges.

1097. Western Australia. Western Australia contains one-third of Australia, but little more than a quarter million people. This is explained by the tropical climate of the north and the vast area of desert interior. West Australia is a tableland, sinking to narrow coastal plains, and like all continental lands on the lee coast in the trade-wind belt is very dry. The north coast has a tropical climate, with great heat and heavy monsoon rains, and is forested near the coast, but hot for white settlement. The centre is dry, even along the coast, and exceedingly so in the interior. The south, the only well-peopled part, has a Mediterranean climate, and the plains produce Mediterranean plants. The high edges of the tableland, which reach 1,500 feet, keep these winds from the interior, which is a desert. Fremantle, at the mouth of the Swan River, is the port of Perth, the capital, a few miles up the river, and Albany is the port of the south coast.

1098. Gold, the chief product, is abundant throughout the desert tableland, but is worked only where water can be had. The Coolgardie goldfield, one of the richest in the world, lies in a waterless region nearly 400 miles from the sea. To supply it and the surrounding mining centres a huge reservoir has been made near Perth by damming the Helena River, from which water is pumped to the summit of the tableland, and carried thence by over 300 miles of piping to Coolgardie, which lies much lower. The famous 'Golden Mile' of Kalgurlie, the chief town of this goldfield, contains some of the richest mines in the world. Coolgardie, Menzies, and other neighbouring goldfields are connected by rail with Perth. Farther north the tableland is higher, but many goldfields are worked round its margin, and Geraldton, in a dry region, exports the gold, copper, and lead of the Yalgoo and Murchison districts.

1099. Agriculture and sheep-farming are unimportant in comparison with mining. The lower valleys of the rivers opening west from the tableland are fertile, and in these wheat is grown and sheep and cattle grazed. The Kimberley region in the north is fertile along the coast, and there is good grazing in the Fitzroy valley, but the climate is against settlement. The towns are small gold-mining centres or ports, engaged in pearl and pearl-shell fisheries.

Exercises

1. With what parts of Africa would you compare (*a*) New Guinea, (*b*) Victoria, and (*c*) Western Australia? Give your reasons.
2. What are the chief natural advantages of Queensland?
3. Write an account of the natural regions and occupations of New South Wales. How do they differ from those of (*a*) Queensland and (*b*) Victoria?
4. 'Tasmanian apples are on sale in this country soon after Christmas.' Explain fully why.
5. Describe the position and geographical importance of Adelaide, Bourke, Brisbane, Geelong, Melbourne, Newcastle, Sydney.

CHAPTER XII

NEW ZEALAND AND THE PACIFIC ISLANDS

1100. Position and Area of New Zealand. New Zealand lies 1,000 miles east of Australia, and extends from lat. 45° S. to lat. 47° S.; i.e. from the latitude of Sydney to 250 miles south of Tasmania. It consists of North Island (44,500 square miles), South Island (58,500 square miles), and Stewart Island (650 square miles). These are separated from each other by Cook Strait, which is under 20 miles at its narrowest, and Foveaux Strait. North and South Island are both over 500 miles long, and Auckland in the north of North Island is 600 miles north of Dunedin in the south of South Island, so that New Zealand is rather longer than Great Britain, but much narrower. It is also much farther from the equator, corresponding in latitude with Italy and Southern France.

1100a. The Dominion of New Zealand also includes the Kermadec, Cook, Auckland, Chatham, and other island groups in the Pacific.

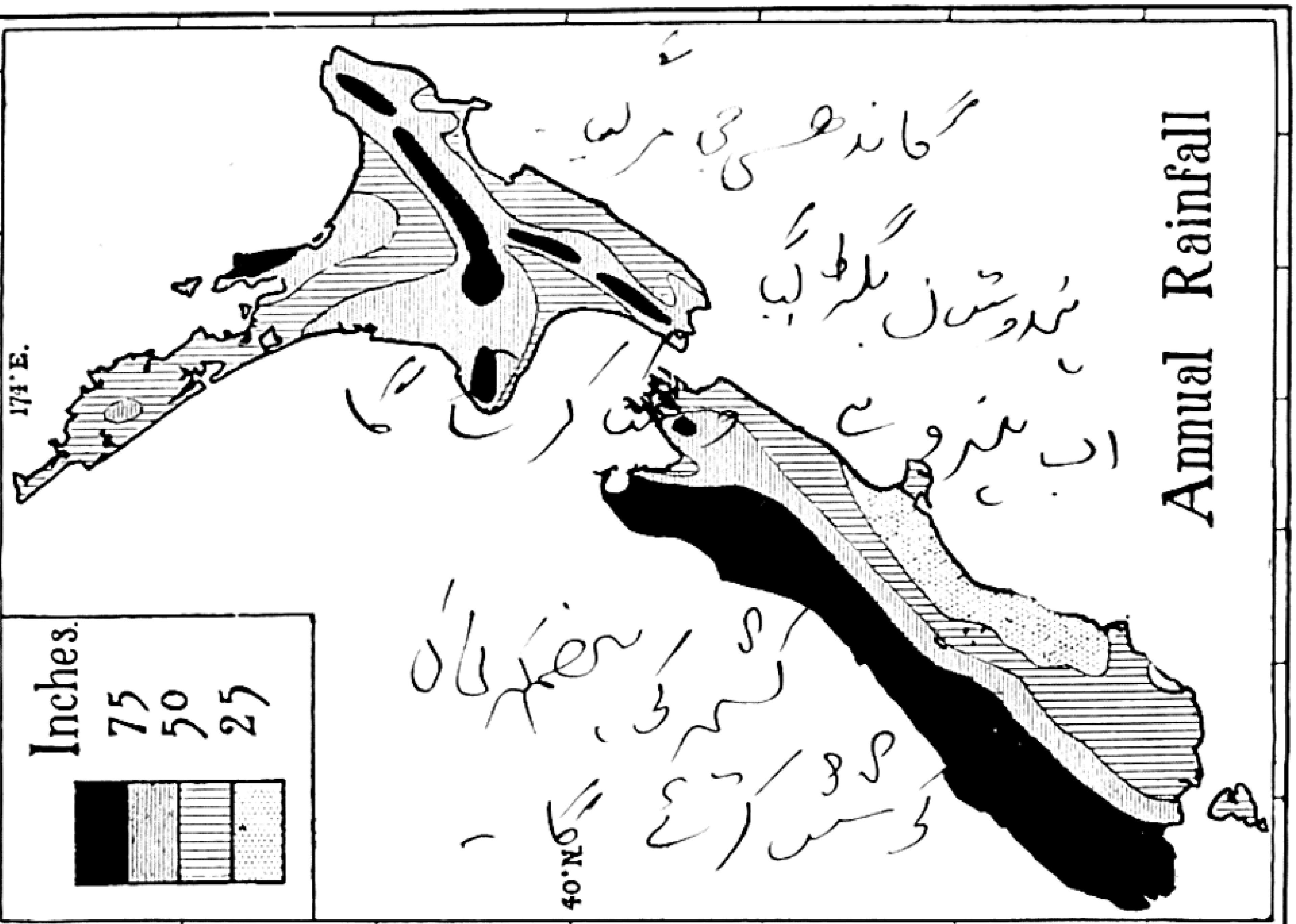


Fig. 70. Mean Annual Rainfall of New Zealand.

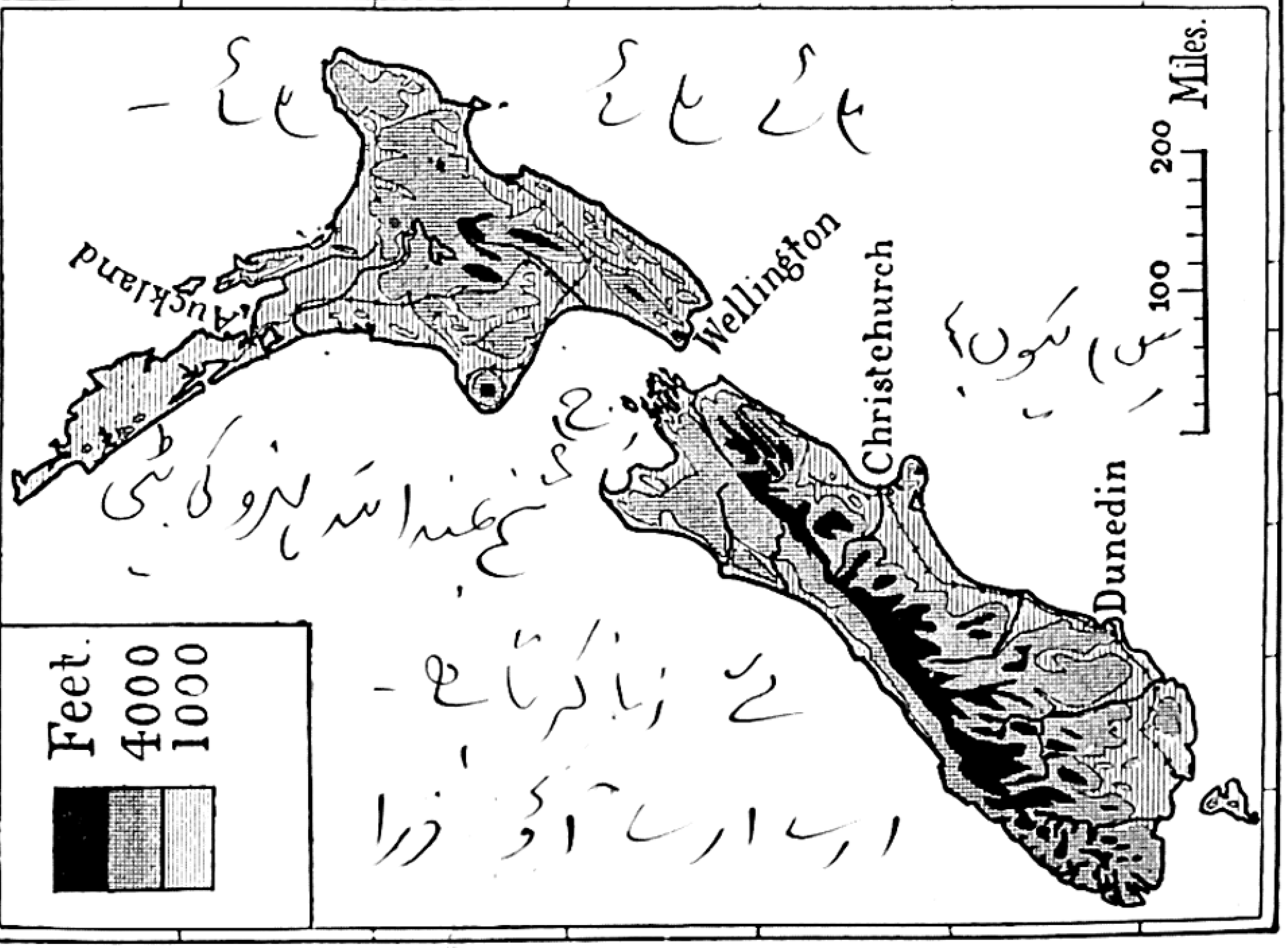


Fig. 69. Relief of New Zealand.

گاندھی جی مرلیہ

ہندوستان بگڑ گیا

اب ہندو سے

کش رہے گا

مسلمانان

کسر کی

کس کی گا

ہے گا ملے گا ملے گا

شیخ عبداللہ ہندو کا بھی

ہس لیکو

ہے زہاگر تاج

ایسا راستہ آؤ ذرا

آؤ ہم کہتا بکواس کرتا ہے

1101. Relief. All the islands are mountainous, with small isolated lowlands opening to the sea. In North Island the mountains follow the east coast and are about 6,000 feet high. West of them is a high volcanic region, with active and extinct volcanoes, geysers, hot springs, mud volcanoes, &c. In the middle of this region, and almost in the centre of the island, is Lake Taupo, the largest lake of North Island (230 square miles), drained by the Waikato, the longest river in North Island. To the west are the high volcanic cones of Ruapehu (9,150 feet), which emits smoke, Nguaruhoe, which throws dust and ashes to a great height, and Tongariro (6,500 feet). Farther west the magnificent extinct cone of Egmont (8,250 feet) towers above Cook Strait. North of Lake Taupo is the Rotorua district, where the flat-topped Tarawera, believed to be extinct until its outburst in 1886, is again quiescent. In 1886 its eruption killed many people, destroyed the famous pink and white terraces, changed the face of the entire region, and poured out such volumes of dust that places 75 miles away had sudden darkness at noonday. Between Lakes Taupo and Rotorua is the greatest geyser basin in the world. Waumayu, in a crater formed by the Tarawera eruption, flings up boiling water, mud, and stones to a height of 1,500 feet. The largest lowland is round the Hauraki Gulf.

1102. In South Island the New Zealand Alps rise steeply from the west coast and cross the island to Cook Strait, trending away from the coast in the north and leaving the narrow coastal plain of Westland. The highest peak is Aorangi (Mount Cook, 12,500 feet). They consist of many parallel ranges, and in some places are 80 miles wide, forming a great mountain barrier not yet crossed by any railway.

1103. The New Zealand Alps are composed of old rocks, but have been upraised in recent ages, and have been little worn down as yet by ice, running water, wind, and weather. They have fine Alpine scenery, with great glaciers and snowfields, long narrow valley lakes, high waterfalls, and swift mountain streams flowing in deep ravines. On the west coast glaciers descend through dense forests to within a few hundred feet of the sea, and deep fiords wind far into the mountains. These are shut in by rock walls 5,000 feet or more high, and the finest (Milford Fiord) are as grand as those of Norway. They form fine natural harbours, but lead only into a rugged land of forests and mountains. These fiords, like the picturesque valley lakes of the eastern valleys, were filled by glaciers in a bygone Ice Age, and both lakes and fiords are several hundred feet deep. The largest of the valley lakes are Te Anau, drained by the Waiau river, and Wakatipu, Wanaka, and Hawea, drained by the Clutha.

1104. The rivers flowing west from the New Zealand Alps are short and rapid, and the longer rivers flow east through gorges to the plains. All carry much water and sediment, and either drop the latter in the valley lakes through which they flow or spread it out as vast deposits of gravel where they leave the higher land. Few are navigable, and only in their lower courses. The Clutha (150 miles) is navigable for the last 30 miles.

1105. The largest lowlands of South Island are the Westland, Canterbury, and Southland Plains. There are few good harbours in the lowlands, but many fair harbours have been artificially improved. The best harbours are in the Banks' and Otago peninsulas, which consist of old hard volcanic rocks.

1106. Climate. The climate of New Zealand should be compared with that of Italy, in the same latitudes of the northern hemisphere, and not with that of the British Isles, which are farther from the equator. New Zealand is long and narrow and exposed for a great part of its length to the cyclonic storms of the western forties. Its position makes its climate mild and uniform. There is a difference of only 8·7° F. between the mean annual temperature of Auckland (58·8° F.) and of Dunedin (51·1° F.), though the two stations are 600 miles apart. A cold Polar current which flows along the west coast reduces the temperature, while the temperature of the east coast is raised by a warm current.

1107. The following figures show the general climate of New Zealand :—

Place.	Latitude.	Longitude.	Height in feet.	Coldest Month.	Hottest Month.	Mean Annual Rainfall.
Auckland .	36° 50′ S.	174° 51′ E.	80	51·2° F.	67·8° F.	54·2 in.
Wellington .	41° 16′ S.	174° 47′ E.	45	50·2° F.	66·6° F.	58·4 „
Christchurch	43° 32′ S.	172° 49′ E.	5	42·4° F.	61·7° F.	22·9 „
Dunedin . .	45° 52′ S.	170° 31′ E.	155	42·4° F.	57·7° F.	53·8 „

The west is on the whole higher than the east, and most of New Zealand lies in the track of the prevailing westerlies for part of the year at least. A rainfall of over 200 inches has been recorded at some west coast stations, and 100 inches is a common rainfall on the western slopes of the New Zealand Alps. The South Island is in the track of the westerly winds throughout the year, but these descend to the eastern plains as warm dry foehn or chinook winds (§ 567a). Christchurch, in the lee of the New Zealand Alps, is the driest weather station in New Zealand. North Island is affected by the westerly winds only in winter, and has a Mediterranean climate.

1108. Plants and Animals. New Zealand was cut off from all other lands by deep seas early in the Earth's history. Two-thirds of its plants occur nowhere else, and the remaining third have wind-borne or water-borne seeds. Wherever the rainfall exceeds 40 inches the island is forested, especially on the westward slopes of the New Zealand Alps. In the northern forests the great kauri pine, not to be confused with the karri eucalyptus, yields a valuable gum, and immense quantities are dug out of the earth on the site of former forests. All Mediterranean fruits flourish in the north of North Island, and camellias and azaleas bloom out of doors. The tree ferns of the New Zealand forests are over 60 feet high, and their minute seeds are carried for long distances by the winds. The so-called New Zealand flax is a species of lily which grows in marshy regions. Where the rainfall is under 40 inches the country is a steppe, but the native grasses are dry, tussocky, and yield little nourishment, and the grasslands have been gradually ploughed up and sown with European meadow grasses.

1109. The animals of New Zealand, like the plants, show the effects of long isolation. The kangaroos, opossums, and wallabies of Australia are not found, nor any of the old-world animals except bats, which were carried by the wind. Before the coming of the white man birds predominated, and as they had no animal foes to fear they had gradually lost the use of their wings. The moa, now extinct, stood 9 feet high, and was a monument of helplessness.

1110. Man. New Zealand was uninhabited till the fifteenth century when the Maoris, a handsome, tall, brown-skinned race, reached New Zealand in great canoes, bringing with them the dog and rat, and taro, yams, and sweet potatoes, the chief food crops of many

Pacific islands. They killed off the fat helpless birds, but were themselves ousted by white settlers. Captain Cook, the English explorer, introduced the pig, which ran wild in the bush and multiplied enormously. Later settlers introduced the domesticated plants and animals of Europe, its vermin, e.g. the rabbit, and its weeds, e.g. the thistle. The coasts and surrounding seas then swarmed with whales and seals, but over-fishing has almost exterminated these.

1111. Minerals. Gold and coal are the most important minerals, but some silver is found. Alluvial gold is found in the Otago Peninsula and in the deposits of many southern rivers, as well as in Westland. Brown coal is found near Auckland and Otago, and excellent steam coal is shipped from Westport and Greymouth for the Royal Navy and the great shipping lines.

1112. Occupations. New Zealand is a land of mountains, with few plains, which are isolated by a broad high mountain barrier. Settlement, both by the Maoris and the British, began on the coast and proceeded inland till stopped by the mountains. Auckland and Wellington, both in North Island, the only two good harbours opening to fertile plains, are respectively the largest town and the capital. Elsewhere the best harbours lead to regions unfit for settlement, and the harbours in the plains have been artificially improved.

1113. New Zealand is mainly pastoral. Millions of sheep are grazed on the Canterbury Plains, which are 160 miles long and 30 miles broad. The coarse native grasses have been replaced by superior varieties, and the rich pasture and dry climate produce excellent wool and mutton. A large trade is done in frozen meat (Canterbury lamb), which is shipped in specially-built refrigerating steamers. Other pastoral products are wool, cheese, butter, hides, leather, &c. The dry warm climate of the grasslands is well suited to wheat; Mediterranean fruits are grown in the north and temperate fruits in the south. New Zealand flax is grown in the marshy lands.

1114. Manufactures do not develop in a young country, but New Zealand possesses many natural advantages for them. The rivers supply water-power, and coal is abundant. Such industries as shipbuilding, with local iron and timber, electrical works, woollen manufactures, the making of leather, boots, shoes, and gloves from hides and skins, and of wine from the vines of North Island will develop as population grows.

1115. Towns. Auckland, with fine harbours on two seas, is the largest town. The seat of government is Wellington, which has easier communication with both islands. Along the east coast plains of the South Island, the two volcanic peninsulas and their good harbours have favoured the growth of Christchurch on the Canterbury Plains (Port Lyttelton, Banks' Peninsula), and Dunedin on the Southland Plains (Port Chalmers, Otago). In the far south Invercargill is a growing industrial centre, working up timber, wool, meat, and cereals.

1116. The Pacific Islands. The Central and Western Pacific are studded with small islands between 30° N. and 30° S. The most important are New Caledonia (French), Hawaii (American), Fiji (British), and Samoa (German and American). The majority are either mountainous forested volcanic islands, or low coral islands. The climate is hot but equable, and the wet and dry seasons are well marked. The volcanic islands are the most fertile, growing sugar, bananas, and other tropical produce. The coco-nut palm is important along the coast, and supplies copra, which is used in many manufactures. The inhabitants of the islands of the south-west are short, dark, and frizzy haired, belonging to the Papuan, or Melanesian race. In the eastern islands they belong to the tall, fairer, and much more intelligent Polynesian race. The majority are clever sailors and fishers, and practise many arts. Many Chinese and Japanese have emigrated to the plantations, especially in Hawaii. Honolulu, in Hawaii, commands all the Pacific sea routes, and is destined to a great future.

Exercises

1. Which are the months referred to in § 1107 as 'hottest month' and 'coldest month'? Give reasons for your selection.
2. New Zealand is often said to be the Antipodes of England. What does this mean? Is it true? How would you word the comparison yourself?
3. Describe the climate, plants, animals, and occupations of New Zealand.
4. Divide New Zealand into natural regions.
5. Show how the geographical situation has helped the growth of Auckland, Honolulu, and Wellington.

-3315

INDEX TO PART V

(The references are to the pages)

Abyssinia, 154, 156.
Adelaide, 221.
Africa, 121-92; size of, 121; relief of, 121-7; lakes of, 125; rift valleys of, 125; volcanoes of, 125-6; rivers of, 126-7; climate of, 128-34; plants of, 135-44; animals of, 137-44; occupations of, 144; peoples of, 145.
Albert L. (Nyanza), 155, 163, 165.
Algeria, 152.
Artesian wells, 152, 153, 198.
Ascension I., 181.
Aswan, 156, 159.
Atbara R., 156.
Atlas Lands, 146-53; Mts., 126, 147-9.
Auckland, 230.
Australasia, 193-232.
Australia, size, 192; relief of, 192-8; rivers of, 198-9; climate of, 201-4; plants of, 204-8; animals of, 208-9; man in, 201-10; political geography of, 211-22.
Azores, 181.

Ballarat, 218, 219.
Bendigo, 218, 219.
Biskra, 146, 152.
Bloemfontein, 190.
Blue Mts., 216.
Brisbane, 214.
British East Africa, 166-7.
Bulawayo, 19, 20.

Cairo, 160.
Canary Is., 181.
Canterbury Plains (N.Z.), 226, 229, 230.
Cape of Good Hope, 187, 188-9.
Cape Town, 188, 189.
Cape Verde Is., 181.
Chad L., 177.
Christchurch (N.Z.), 230.
Climate, statistics, 128, 146, 157, 165, 168, 169, 174, 184, 201, 203, 204, 227.
Congo R., 126, 180-1; State, 180-1.
Coolgardie, 222.

Darling Downs, 214, 215; R., 199, 216, 220.
Deserts, 142, 150-1, 154-62, 181, 184, 186, 189, 196-8, 203, 220, 221, 222; Kalahari, 186; (Australian), 196-8, 221-2.
Drakensberg Mts., 182, 185, 190.
Dry season, adaptation of plants to, 134-7.
Durban, 190, 191.

East Africa, 163-173; Lake Plateaus of, 163-5; climate and products of, 165-6; political geography of, 166-73.
Edward L., 155, 163, 165.
Egypt, 154-62; importance of the Nile to, 154-5, 158-60; products of, 159-60; towns and routes of, 160-2.
Eyre L., 197, 214.

Fez, 152.
Fiji, 230.

Gambia, 179; R., 177.
German East Africa, 168-9.
German South-west Africa, 187.
Gold, 179, 187, 191, 210, 211, 213, 214, 215, 216, 218, 219, 221, 222, 229.
Gold Coast, 179.
Great Barrier Reef, 194-5, 214.
Guinea Lands, 174-80.

Hausaland, 177-8.
Hawaii, 230.
Honolulu, 230.
Hunter R., 215, 216.

Irrigation, 159-60.

Johannesburg, 191.

Kalahari Desert, 184.
Kano, 177, 178.
Karroo, 182, 189.
Kenya Mt., 165.
Khartum, 155, 156, 157, 158.
Kilimanjaro, 165, 169.
Kimberley, 188.
Kola nuts, 178.

Liberia, 179.
Limpopo R., 186.
Lokoja, 177, 178.

Madagascar, 173.
Madeira, 181.
Mauritius, 173.
Melbourne, 219.
Morocco, 152.
Mozambique, 173.
Murray R., 199, 216, 217, 218, 219, 220.
Murrumbidgee R., 199, 216.

Nairobi, 166.
Natal, 187, 190.
New Guinea, 211.
New South Wales, 215-18.
New Zealand, 223-30.
Newcastle (N.S.W.), 218.
Niger R., 126, 178-9.
Nile, cataracts of, 156; R., 126, 154-62, 165; course of, 155-7; climate of, 157; floods of, 154-5.
Northern Nigeria, 177-8.
Nyasaland, 169-73.

Oases, 150, 152, 153.
Occupations, 144, 151, 160, 166-7, 170, 176, 177, 181, 188, 189, 191, 206-10, 215, 216, 219, 220, 221, 222, 229.
Orange Free State, 187, 190.
Orange R., 185-6.

Perth (W.A.), 222.
Pietermaritzburg, 190.
Port Elizabeth, 188.
Port Florence, 168.
Port Phillip, 2, 8.
Pretoria, 199.
Pygmies, 181.

Queensland, 213-15.

Rainfall of Africa, 131-4.
Rand (Witwatersrand), 187, 191.
Reunion, 173.
Rhodesia, 169, 187, 191-2.
Rift valleys, 125.
River floods, 158-60.
Rivers, work of, 127.
Roaring Forties, 220.
Rockhampton, 214.
Rubber, 167, 180.
Ruwenzori, 165.

Sahara, 150-1.
Samoa, 230.
Savanas, 142, 206.
Senegal, 177.
Sheep-farming, 187, 209, 213, 216, 219, 229.
Shiré Highlands, 169, 170, 172, 173; river, 169, 172.
Sierra Leone, 179.
Sokoto, 177, 178.
Somaliland, 156.
South Africa, 182-92; relief of, 182; climate of, 184-5; rivers of, 185-6; plants and animals of, 186-7; minerals of, 187; peoples of, 187; political divisions, 188-92.
South Australia, 220-1.
Southern Nigeria, 180.
Sudan, Egypt, 155-8; (Nigeria), 177-9.
Suez Canal, 121, 160, 162.
Sydney, 216, 218.

Tanganyika L., 162, 169, 172.
Tangier, 52.
Tasmania, 220.
Tell (Algiers), 148, 152.
Teneriffe, 181.
Timbukto, 178.
Togoland, 179.
Torrens L., 198.
Transvaal, 187-91.
Tripoli, 153.
Tropical climate, 133-4.
Tropical forests, 140, 211, 213.
Tunisia, 153.

Uganda, 166-9

Veld, 182.
Victoria (Aus.), 218-19.
Victoria Falls, 172; L. (Nyanza), 155, 163, 165, 166, 167.

Walfisch Bay, 172.
Wellington (N.Z.), 230.
West Africa, 173-81; climate of, 173-6; products of, 176-7; political geography of, 177-81.
Western Australia, 221-2.
Wimmera, 218, 219.

Zambezi R., 126, 169, 170-2.
Zomba, 173.
Zungeru, 178.

Mahtma Ghandi died on 30 Dec 1948

PART VI

AMERICA

CHAPTER I

THE RELIEF OF AMERICA

Use the globe, the coloured maps in this book, and the Oxford Wall Maps of America.

1117. Size and Position. America, or the New World, so called because it was not known to Europeans till 1492, is about half as large as the Old World. It consists of two great continents, North America (8,000,000 square miles with islands) and South America (7,000,000 square miles), united by the narrow isthmus of Central America (275,000 square miles). The mainland stretches from latitude 71° N. to latitude 54° S., and the frozen northern archipelago extends to within a few hundred miles of the North Pole. The south of North America is crossed by the Tropic of Cancer, and the Equator and the Tropic of Capricorn cross South America. The West Indies (100,000 square miles), an archipelago between the northern tropic and the equator, are closely connected with Central and South America.

1118. The Norsemen, who discovered Greenland, probably reached the mainland of North America about A. D. 1000, but their voyages soon became legendary. The real discoverer was Columbus, who was seeking a western route to Eastern Asia and India, and reached the West Indies in 1492. Their name shows that he thought he had succeeded. Discovery and settlement went on quickly. Cabot, sailing from Bristol, reached Newfoundland in 1498, the first English colony in North America.

1119. America is a great island, washed by the Arctic Ocean on the north, by the Southern Ocean on the south ; on the east by the Atlantic Ocean (40,000,000 square miles), which separates it from Europe and Africa ; and on the west by the Pacific Ocean (70,000,000 square miles), which separates it from Asia and Australia. It forms a land barrier between the Atlantic and Pacific except in the extreme north and south. The northern routes between them, by (i) the north-east passage, through the Arctic seas of the Old World, and (ii) the north-west passage, through the Arctic seas of the New World, are in high latitudes and seldom ice-free ; but the southern routes, (i) round the Cape of Good Hope and across the Indian Ocean, and (ii) round Cape Horn, in South America, are open all the year. Both are very long, and the Horn route is exposed to fierce westerly gales and mountainous seas. Sailing vessels going round the

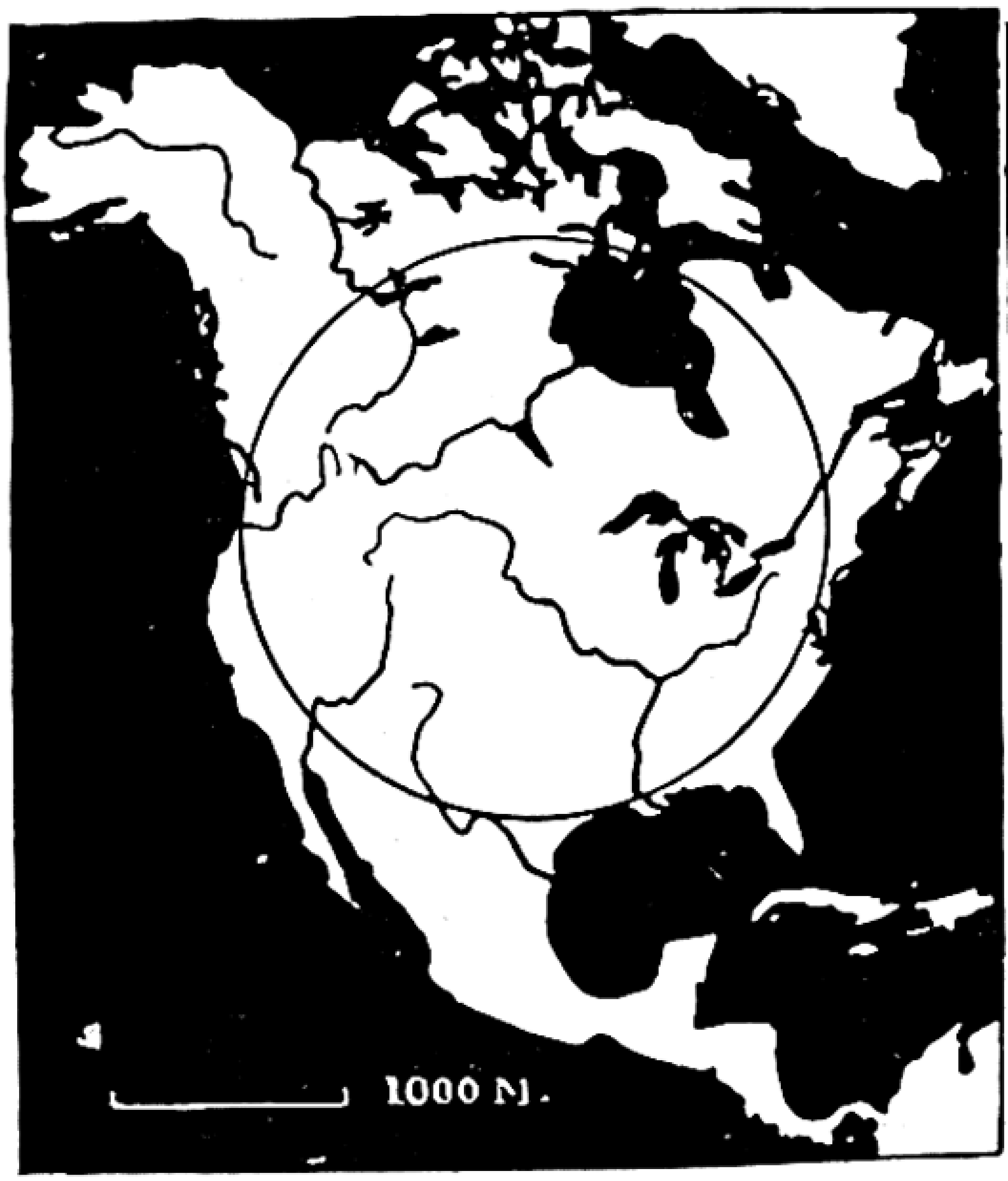


Fig. 71. Distance from Sea in North America.

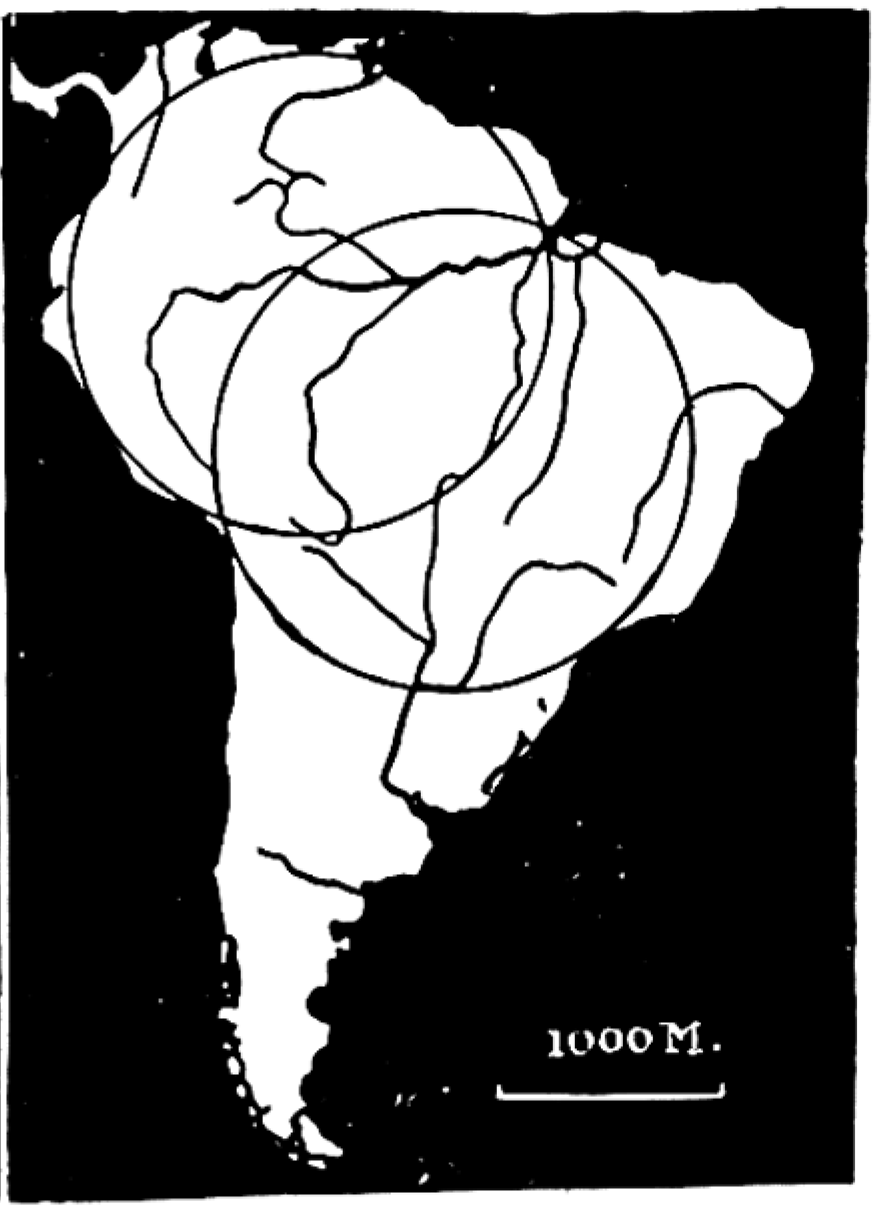


Fig. 72. Distance from Sea in South America.

world go out round the Cape and return by the Horn, to use the prevailing westerlies as far as possible. Steamers make the passage in either direction, but usually go through Magellan Strait, between Tierra del Fuego and the mainland of South America, instead of rounding the Horn. A ship canal to connect the two oceans and shorten the routes by many thousand miles is being cut across the Isthmus of Panama in Central America.

1120. The Pacific is wider than the Atlantic except in the extreme north, where the Arctic shores of Asia and the New World approach within 36 miles at the shallow Bering Strait. The eastern shores of Arctic North America are separated by Baffin Bay and Davis Strait from the ice-capped island of Greenland (500,000 square miles).

1120a Liverpool is 2,600 miles from Quebec, over 3,000 from New York, and 4,000 from Jamaica in the West Indies, but the distance from Queenstown in South Ireland is considerably less. Victoria, the chief port of British Columbia, is 4,200 miles from Yokohama in Japan, the nearest Asiatic port. Rio Janeiro, on the east coast of South America, on the southern tropic, is nearly 7,000 miles from Wellington in New Zealand, round the Horn.

1121. Compare the shape and position of North and South America on the globe and in the coloured maps. Both are roughly triangular, broad in the north, and very narrow in the south. This resemblance is of little importance, for North America is broadest in temperate and South America in tropical latitudes. South America is much more compact than North America, and its coast-line (17,800 miles) is correspondingly smaller than that of North America (46,600 miles), which has a longer coast-line for its area than any other continent. Figs. 71, 2 show the distances from the sea in North and South America. Other resemblances between the physical features of the two continents are pointed out in §§ 1125, 6.

1122. Cape Murchison, on the Boothia peninsula, and Tehuantepec, the extreme north and south points of North America on the same meridian, are 3,900 miles apart, and the greatest breadth is about the same. South America has a length of 4,700 miles, or nearly that of Africa, and a maximum breadth of 3,250 miles.

1123. North America, like Eurasia, lies north of the equator and is broadest in temperate latitudes. The globe shows that the two continents are in very similar latitudes, and this causes many other resemblances. North America, however, is narrow in comparison with the immense breadth of Eurasia, and this has a marked effect on the climate. Hudson Bay, a great Atlantic gulf of North America, is in almost the same latitudes as the Northland Seas of Atlantic Eurasia, but is more compact in shape. There is little resemblance between the southern coast of North America, with the small peninsulas of Florida and Yucatan, and the southern coast of Eurasia, which is cut by the sea into many large peninsulas. The West Indies suggest a comparison with the East Indies, but are nearer the northern tropic. The seas enclosed between them and the mainland of America are sometimes called the American Mediterranean, but are in much lower latitudes than the European Mediterranean and form an entirely different natural region.

1124. South America is very like Africa in shape, but differs in latitude. The parallel of 10° N., which just cuts the north coast of South America, crosses the broadest part of Africa. South America is broadest between the equator and 20° S., but Africa narrows rapidly in these latitudes. South America also stretches much farther south than Africa, into latitudes corresponding with those of Southern Scotland, while the

Cape is nearly in the latitude of the Plate river in South America. The distribution of high and low land is also entirely different, as may be seen from the coloured maps. In Africa the highest land is near the equator and on the east, but in South America most of the equatorial lands are under 600 feet and the highest land is in the west. The most striking resemblance between South America and Africa, after their shape and compactness, is that each has a great river flowing through the hot wet equatorial belt a little south of the equator and almost parallel to it. Owing to the position of the highest land the Amazon flows east, whilst the Congo flows west. The course of the Orinoco somewhat resembles that of the Niger in the same latitudes, but the directions are reversed.

1125. General Relief of America. Compare the coloured maps of North and South America. In both the highest land is along the Pacific coast, and there is a lower belt of high land along the Atlantic coast. This gives three belts of relief: (i) the Atlantic Highlands, (ii) the Central Plains, and (iii) the Pacific Mountains. In both continents the Atlantic Highlands are much older and more worn down than the much higher Pacific Mountains. The similarity of relief causes a general resemblance in the direction of the rivers, and the Nelson may be compared with the Orinoco, the St. Lawrence with the Amazon, and the Mississippi with the Plate.

1125a. The average height of North America is 2,300 feet, but about one-third is under 600 feet. It is therefore higher than South America (1,900 feet), where about the same proportion is under 600 feet, but considerably lower than Asia, which has an average elevation of over 3,100 feet and a much smaller proportion of lowland. South America is lower than Africa (2,130 feet), and has a much greater proportion of land under 600 feet.

1126. Figs. 78, 99 shows the depth of the sea as well as the height of the land. The course of the −3,000 feet

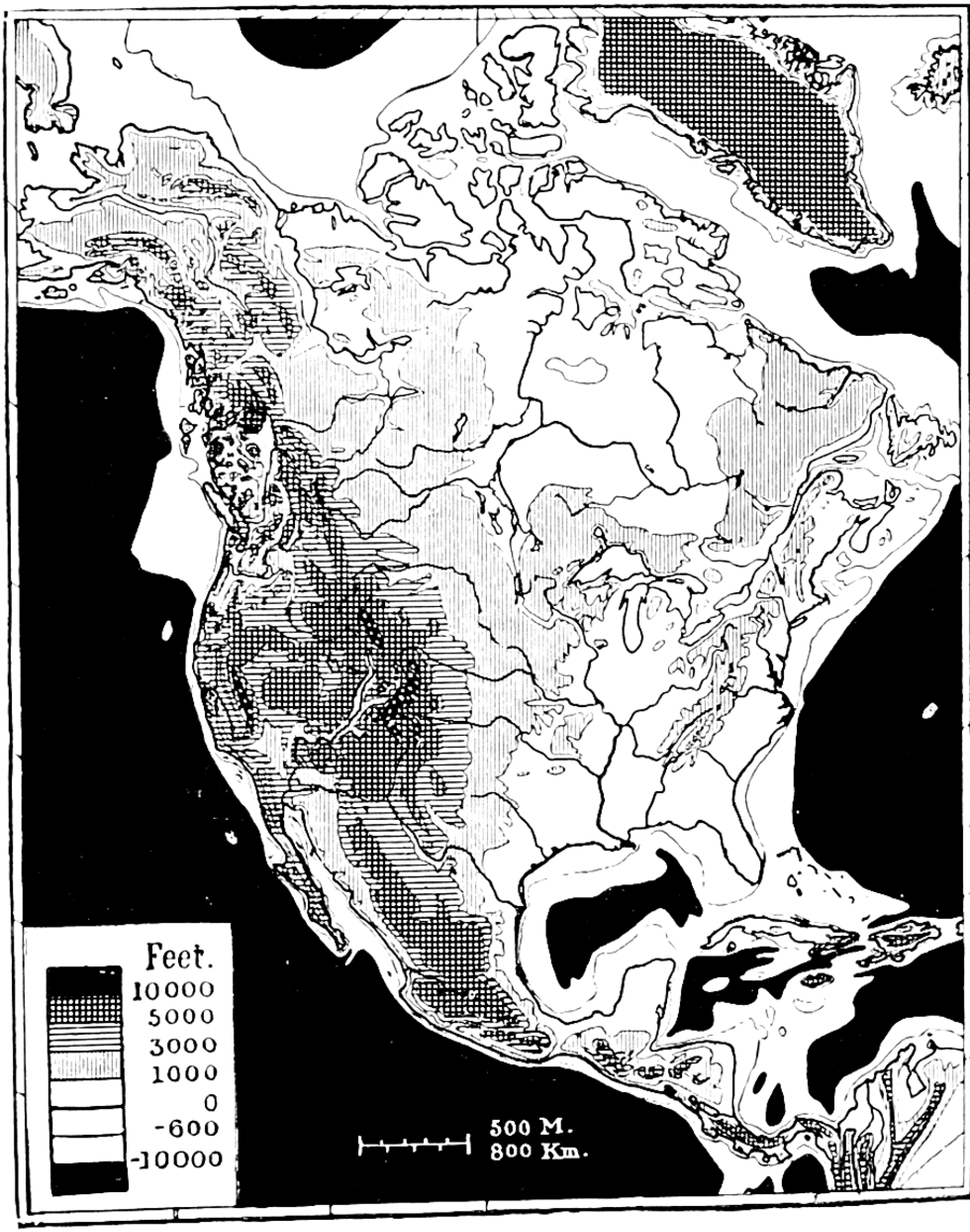


Fig. 73. Relief of North America.

contour line in North America suggests that the New World was once united to the Old through Greenland and Iceland, but if so extensive subsidences have taken place. The similarity of the plants and animals (Ch. V) also suggests that a former land connexion once existed. The Pacific continental shelf of North America is narrow except in the far north, where Eastern Asia and Alaska were once continuous. Subsidences formed Bering Strait, round which active and extinct volcanoes are found. The Pacific continental shelf of South America is also narrow and the highest mountains of the continents rise out of very deep seas. The Atlantic continental shelf is much broader, and shows a submarine connexion between the lands surrounding the American Mediterranean. Yucatan and other Caribbean regions have been greatly altered by rising and sinking of the land.

1126a. North America would be joined to Northern Asia if the sea sank or the land rose 600 feet.

1127. The Volcanoes of America. These are numerous in the Pacific Mountains, but the Atlantic Highlands have been so worn down that few traces of volcanic action remain.

1128. The Rivers of America. The rivers flowing north to the Arctic Ocean, of which the Mackenzie is the longest, resemble the Siberian rivers in the same latitudes. They freeze in winter, and melt in spring, producing great floods which extend downstream as the season advances (§§ 667, 742–4). The St. Lawrence drains a series of great inland lakes and carries much water out to sea, but is icebound in winter. The Mississippi carries an immense volume of sediment from the Pacific Mountains to the Gulf of Mexico, and has built up a great delta. It is flooded in spring, when the snows melt in the basin of the tributaries from the

Pacific Mountains. The Amazon, like the Congo, is flooded in the rainy season, and carries immense quantities of water and sediment out to sea. The Plate is flooded after the summer rainy season, and has covered its basin with deep alluvium. In the drier parts of North and South America the rivers either run dry or form basins of inland drainage.

1129. Political Divisions of America. Both North and South America have been conquered and colonized by Europeans, but North America, which lies in temperate latitudes, has more pure whites (Teutonic and Scandinavian) than South America, where the Spaniards and Portuguese intermarried freely with Indians. Nearly all the states of the New World are republics, but Canada, some of the West Indies, and a small part of South America are British, and Denmark and Holland have small colonies. The largest republics are the United States and Mexico in North America, and Brazil and Argentina in South America.

Exercises

1. What winds assisted Columbus in his voyage across the Atlantic Ocean and determined his landing-place? Did winds help Cabot to the same extent? Illustrate your answer by a sketch-map if possible.
2. Point out the most striking resemblances between North America and any other continent, and explain how far they have any geographical importance.
3. Do the same for South America.
4. Why is the St. Lawrence ice-bound in winter? How far does this affect communication?
5. Why is the continental shelf shown in Fig. 73? Write a description of it. What facts does it bring out?

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CHAPTER II

THE ATLANTIC HIGHLANDS AND THE CENTRAL PLAINS OF NORTH AMERICA

1130. The Atlantic Highlands. These consist of the Laurentian Highlands, north of the St. Lawrence, and of the Appalachian Highlands south of it. They are 500 miles broad in the north, where they reach the sea as the Labrador peninsula, and 150 miles broad south of the St. Lawrence. Newfoundland, and other islands at the mouth of the St. Lawrence, and probably Greenland, have been cut off by the sinking down and drowning of the land between.

1130a. The Atlantic Highlands were once high mountains, bounded on the west by sea. This was gradually filled by the sediment of the rivers which flowed to it, and now forms Hudson Bay in the north, dry land in the centre, and the Gulf of Mexico in the south. Such changes extend over an immeasurable length of time.

1131. The Laurentian Highlands. The Laurentian Highlands are part of a very ancient mountain system which has been worn down to a plateau, enclosed between Hudson Bay, the St. Lawrence, and a chain of lakes (Huron, Superior, Winnipeg, Athabasca, Great Bear and Great Slave). Hudson Bay is nearly in the middle of this plateau, which sinks in the west to the Central Plains, but reaches 5,000 feet in Labrador. It falls on the south to the valley of the St. Lawrence, above which it rises as a range of rounded forested hills, crossed by tributaries which form falls in their descent. The finest of these are the Montmorenci Falls, near Quebec (225 feet). The water-power of these rivers favours the growth of industrial towns in the St. Lawrence valley along the base of the escarpment.

1132. The Laurentian Plateau is a bare rocky region, almost destitute of soil, and very infertile. The sedimentary rocks which once covered it have been worn away, exposing the oldest rocks. It was already greatly worn down at the beginning of the Ice Age (§ 115), when an ice sheet like that of Greenland (§ 1133c) covered it. This wore away all that remained of the softer rocks, carried their waste along as moraines, and spread it out as boulder clay over the St. Lawrence valley and the plains west and south of the Great Lakes.

1133. The map shows that the Laurentian Plateau, like the Baltic Lake District, which was glaciated in the same way (§§ 525, 588), is covered with innumerable lakes. These fill hollows in the surface rock or in the glacial drift, and are often drained in different directions by more than one river.

1133a. The divide between Hudson Bay and the St. Lawrence, locally called the 'height of land', is seldom over 1,500 feet.

1133b. The Adirondacks, east of Lake Ontario and west of the Hudson River, are part of the Laurentian Highlands, though south of the St. Lawrence.

1133c. Greenland is a rugged plateau, reaching 9,000 feet, covered by an ice sheet several thousand feet thick. It is highest near the east coast, which is washed by a cold current and is almost uninhabited. The west coast, washed by a warm current, has a fringe of tundra, which explains the name given to it by its Danish discoverers. The natives are Eskimo, who fish and hunt seal, walrus, and other fur-bearing animals. Julianshaab, with 2,500 people, is the largest settlement.

1134. The St. Lawrence and the Great Lakes. The St. Lawrence, the chief river of the Atlantic Highlands (2,000 miles), carries to the Atlantic the waters of the Great Lakes. Superior (31,420 square miles, 360 miles long), Michigan (25,600 square miles), Huron (23,780 square miles, 280 miles long), Erie (10,000 square miles), and Ontario (7,330 square miles, 200 miles long) fill rock basins which were deepened by glaciers in the Ice Age and afterwards dammed by moraines.

1135. The St. Louis, the farthest stream of the St. Lawrence, which is not known by that name till it leaves Lake Ontario, flows into Lake Superior, the largest fresh-water lake in the world, which is as large as Ireland. Its surface is over 600 feet above the sea, but its bottom is below sea-level. The river which leaves it, the St. Mary, descends about 25 feet to Lake Huron, forming the rapids of St. Mary's Leap (Sault Ste Marie, or Soo). These interrupt navigation, but are avoided by canals. Lake Huron, 580 feet above the sea, is twice as large as Holland, and Michigan, which is still larger, is a southern extension of it. Georgian Bay, a northern arm of Lake Huron, is almost cut off by peninsulas and islands. The river which flows out of Lake Huron, the St. Clair, widens to a small lake of the same name and leaves it as the Detroit River. This flows into Lake Erie, which lies only about 10 feet lower than Lake Huron, and is rather smaller than Belgium. Erie is the shallowest of the Great Lakes, and therefore freezes most easily, though all the lakes freeze round the coast in winter.

1136. The four upper lakes are on the Laurentian Plateau and differ little in level, but Lake Ontario, which receives their surplus waters, lies 330 feet below them. The Niagara River, which connects them, forms rapids (55 feet) midway between the two lakes, and leaps over the precipitous edge of the escarpment at Niagara Falls, the grandest in the world. The river, which is over a mile wide above the falls, and flowing swiftly, is divided by a small island into the horseshoe-shaped Canadian Fall (158 feet, edge 3,010 feet), over which four-fifths of the river passes, and the American Fall (167 feet, edge 1,080 feet). The waters fall amid clouds of spray and a thunder of sound, which is heard for many miles, into a narrow gorge, shut in between rock walls 250 feet high, through which it continues its descent for 7 miles in boiling rapids.

1137. Niagara Falls are interesting for many reasons, geological and human. The falls and the gorge show the great erosive power of running water. Niagara Falls were once 7 miles down stream, at the entrance to the present gorge, where Queenston Heights mark the line of the escarpment. The river has gradually cut the fall back upstream and formed the long gorge below them, and the recession of the falls and the lengthening of the gorge are still going on. Human life is affected in many ways. Niagara Falls interrupt the navigation of the finest natural waterway in the world, and though river steamers penetrate inland by the Welland and other canals, larger vessels cannot do so. Thousands of tourists visit the falls every year, and this traffic has led to the growth of many neighbouring towns. The water-power, which once ran to waste, is now used to generate electricity, which is put to many uses, and is transforming a region of solitary beauty into a great manufacturing area.

1138. Lake Ontario, which is as large as Wales, is very deep. Its shores are under 100 feet high, and there are many good harbours. Below it the St. Lawrence widens to the beautiful Lake of the Thousand Isles, and forms rapids as it descends to Lake St. Louis, above Montreal. The Lachine rapids prevent large ocean liners from ascending above Montreal, but smaller vessels pass inland by canals and reach the upper end of Lake Superior. The Ottawa, the chief tributary of the St. Lawrence, comes in from the north at Montreal.

1139. The St. Lawrence estuary is deep and wide, and can be traced for several hundred miles along the

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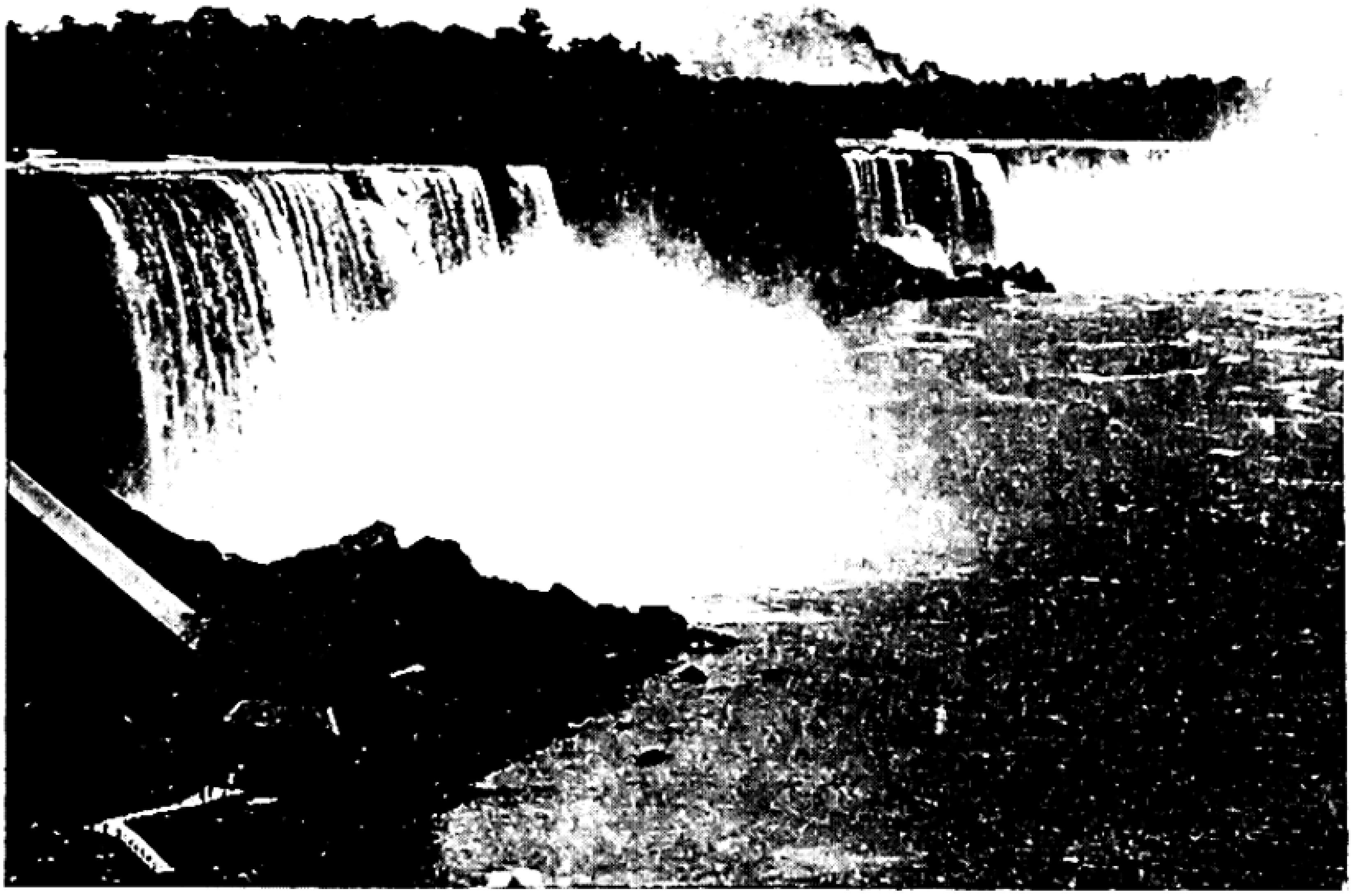
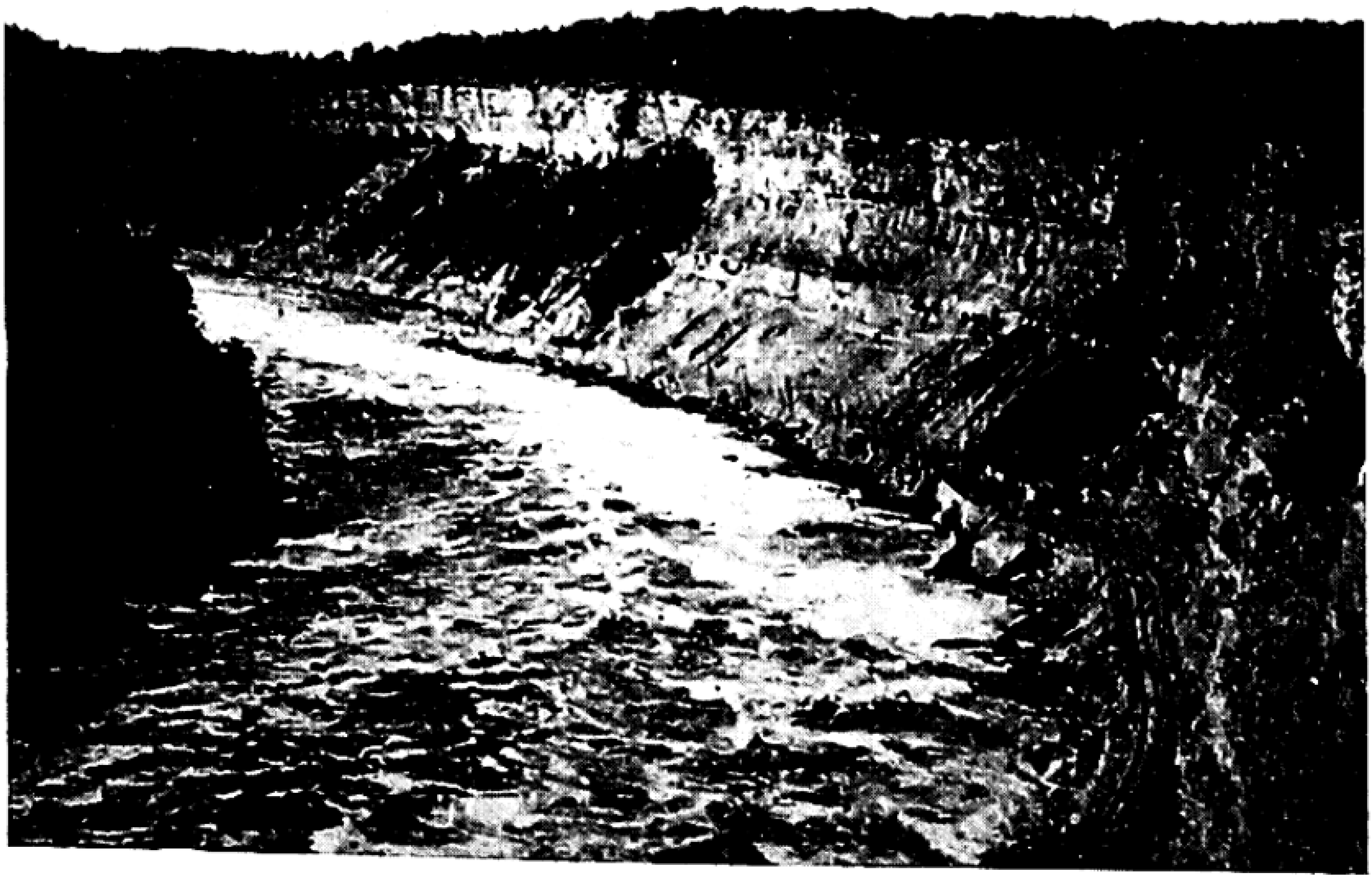


Photograph by Underwood & Underwood.

Fig. 74. Niagara Falls.



Photograph by Underwood & Underwood.

Fig. 75. The Gorge below Niagara Falls.

This gorge has been gradually cut out by the river, and the falls have slowly moved up stream. Notice the rapids and the railway along the side of the gorge.

sea floor beyond the present coast-line. The tide comes up the estuary to Three Rivers, between Montreal and Quebec (900 miles). The St. Lawrence is closed by ice in winter, and Halifax in Nova Scotia, St. John in New Brunswick, or New England ports are then used.

1140. The Appalachian Highlands. These extend for 2,000 miles from Newfoundland almost to the Gulf of Mexico. They sink on the east and south to the coastal plain, which is broadest round the Gulf of Mexico, and on the west to the Central Plains. East of the Hudson they are known as the New England Highlands, which have been much denuded.

1141. South of the Hudson several parallel belts can be traced: (i) the coastal plain, formed of recent deposits; (ii) the piedmont belt, where old crystalline rocks have been exposed by denudation, forming a rugged hilly country, fertile only where rivers cross it; (iii) the crystalline Eastern Appalachian ridge, rising steeply above the piedmont belt; (iv) the broad Appalachian Valley, opening north to the St. Lawrence and south to the Gulf of Mexico; (v) the western or Allegheny ridge which forms the edge of (vi) the Allegheny Plateau, which sinks to the Central and the Gulf Coastal Plains. In the last three belts the older crystalline rocks are covered by more recent sedimentary rocks, including the coal measures.

1142. The northern coast of North America has alternately risen and sunk, but the present land surface is due to a slow sinking which is still going on. This has drowned the valleys of Labrador, forming a fiord coast, cut Newfoundland off from the mainland by Cabot and Belleisle Straits, drowned the St. Lawrence and Hudson valleys, and formed fine deep-water harbours at the mouth of many Appalachian rivers. The sinking of the coast has reduced the area fit for settlement, but this loss is counterbalanced by the many deep-water channels which lead far inland and form good harbours.

1143. The connexion between the shaping of the land and human life is also well seen in the piedmont belt. There the higher land has been denuded so as to expose the older harder rocks, and the rock waste is spread out as fertile soil over the river valleys. The rivers flow swiftly and supply cheap water-power as they cross the piedmont belt, and form falls where they descend to the coastal plain. A chain of thickly peopled industrial towns has grown up along this 'fall line' (§§ 1131, 1266).

1144. In the next belt the land forms retard instead of favouring human settlement. The Eastern Appalachians consist of old crystalline rocks, and though the height is not over 7,000 feet, all routes from east to west are difficult. The landscape of the Northern Appalachians consists of rounded forested hills, deep fertile valleys, and morainic lakes. The broad Connecticut valley opens a route across the New England Highlands, between the White Mountains (Mount Washington, 6,280 feet) and the Green Mountains. A great furrow crosses the Appalachians from the St. Lawrence to New York. The northern end is filled by Lake Champlain, and the southern end forms the valley of the Hudson, which runs almost due south to New York. Still more important is the Mohawk, a right bank tributary of the Hudson, which rises near Lake Ontario and opens a direct route by its low broad valley to the Great Lakes.

1145. Seen from the east, the edge of the Appalachian Highlands looks like a mountain range, blue in the distance and often called the Blue Ridge. Mount Mitchell (6,710 feet) is the highest point.

1146. The Southern Appalachians are broader and higher than the Northern, but there are few good routes across them, for the rivers descend in steep narrow valleys which are of little use for communication. The broad coastal plain is often swampy.

1147. The Appalachian Valley. This lies between the eastern ridges and the steep western escarpment, and is broadest in the south. It varies in height from 200 to 2,000 feet, and is crossed by low heights which form divides between the rivers. The floor is deeply covered with rock waste brought down by the rivers from the ridges which shut it in, and is fertile farming land.

1148. The Allegheny Ridges form the western edge of the Allegheny plateau. Seen from below they look like mountains and are known by many names (Catskills, Cumberlands, &c.). The region west of the Appalachian valley is densely forested, and deeply cut by the streams which flow from it. There are no easy routes across it to the Central Plains, where the Ohio gathers up the waters of many rivers.

1149. The Appalachian Rivers. The Appalachian rivers, like the ranges and valleys, have a long history, and took their courses when the land stood higher and was not worn down into the present heights and hollows. The Delaware, Susquehanna, Potomac, James, and others rise west of the Appalachian valley, flow across it, and break eastward in gorges through the Eastern Appalachians to the piedmont belt and the coastal plain. The Tennessee, a tributary of the Ohio, rises east of the Valley, crosses it, and breaks west through the Allegheny plateau to the main stream.

1149a. The course of these rivers is very similar to those of the Kentish Weald (§ 398), and can be explained in the same way. Remember, however, that the Appalachians are much older than the Weald.

1150. The Atlantic Highlands are rich in minerals and building stones. Gold, copper, silver, and nickel are found in the Laurentian Highlands, especially round Lake Superior. Granite, slate, and marble are quarried in the New England Highlands. Coal is widely distributed, but the most important coalfields are (i) the Pennsylvania coalfield, in the Northern Appalachians, with Pittsburg as its centre, a region rich in petroleum and natural gas, and within easy reach of the iron and copper mines near Lake Superior; and (ii) the Alabama coalfield in the Southern Appalachians, with Birmingham as its centre, producing coal, iron, and limestone. Great metal industries have grown up on both.

1151. The Central Plains. The Central Plains include nearly one-third of North America, and stretch from the western base of the Atlantic Highlands to the foothills of the Pacific Mountains. In the west they are 3,000 feet high and are known as the High Plains. The rise is so gradual that they seem almost level, but west of Lake Winnipeg, in Canada, two well-marked terraces can be traced. The divides between the rivers are low and in the north are formed by morainic heights. The northern plains have been much glaciated and the old hard rock is thinly covered with soil, and dotted with thousands of morainic lakes. In the north-east this region forms the Barren Grounds of Canada. South of this is a belt covered with deep deposits of boulder clay, which has buried the old surface features, filled the lake basins and river valleys, and produced a very fertile soil. The southern half of the Central Plains is in the basin of the Mississippi.

1151a. The Ozark and Washita Hills, west of the Mississippi, are outliers of the Appalachians, and the Black Hills of Dakota are outcrops of hard igneous rock.

1152. Rivers of the Central Plains. The Mackenzie (2,400 miles), flowing north to the Arctic Ocean, and the Nelson (1,650 miles) flowing east to Hudson Bay, are the longest rivers of the plains in the north. Separated by a low divide, each flows across a glaciated country, which is covered by a network of lakes and streams. In such a region the lakes are slowly becoming smaller, and the rivers larger. The Athabasca, Great Slave, and Great Bear lakes, and many smaller ones, and the Athabasca, Peace, and Liard rivers from the western mountains, are drained to the Mackenzie. The Saskatchewan flows to Lake Winnipeg (9,400 square miles), which receives the surplus waters of Winnipegosis (2,000 square miles), Manitoba (850 square miles), and other lakes. All the rivers and lakes of this region are frozen in winter, and cause great floods when the ice breaks up.

1153. The Missouri-Mississippi. The Mississippi, the main stream, rises 1,500 feet above the sea in a small lake among forested morainic hills west of Lake Superior, which was probably drained to it before glacial deposits dammed the exit. The Mississippi has an average fall of $\frac{3}{4}$ foot a mile in its course of 2,500 miles and is a typical river of the plains, flowing with a sluggish current, except at St. Anthony's Falls, where it cuts through morainic heights. Below this it is navigable for 2,000 miles. The Missouri, its longest tributary, is a typical mountain river in its upper course, rising high, descending in steep valleys, wearing down its basin, and carrying much sediment. Its Indian name means the great muddy river. If taken as the main stream it is the longest river in the world (4,220 miles). The Missouri gathers up the waters of the Yellowstone, Platte, Kansas, and other rivers from the Western Mountains, and enters the Mississippi after a course of about 2,500 miles.

1154. The Mississippi valley is shut in by cliffs or 'bluffs' formed by the edges of the land it crosses. Its broad flood plain begins below its confluence with the Missouri, and the sluggish river winds across it from bluff to bluff, often changing its course after its yearly floods, which are heaviest in spring when the mountain snows melt. It receives the Ohio, from the Appalachians, on the left bank, and the Arkansas (pronounced Arkansaw) and the Red River on the right bank. In this part of its course it does no erosive work, but builds up new land, and may be compared with the lower Hwang-ho (§ 868). Both rivers as their currents slacken drop much sediment on to the floor of their beds, which are thus raised above the flood plain and must be embanked to prevent inundations. The Mississippi is protected by levees, which keep it to its course, but if these give way the land on either side, which slopes away from the river, is flooded. About 100 miles from the sea the delta begins and the river breaks up into many distributaries. The Mississippi delta is growing rapidly into the Gulf of Mexico, and much sediment is carried out to sea.

Exercises.

1. Write a description of the Great Lakes and the St. Lawrence, and illustrate your answer by a sketch-map.
2. Point out any connexion between the geological history of a region and the life of man. Use the Laurentian Highlands as an illustration.
3. 'The St. Lawrence estuary can be traced for several hundred miles along the sea floor beyond the present coast-line.' How can you explain this? Give any other examples which occur to you.
4. Point out any connexion between the land forms of a region and the life of man. Use the Appalachian Highlands as an illustration.
5. How far do the Mississippi and its tributaries illustrate the work of rivers, whether constructive or destructive?

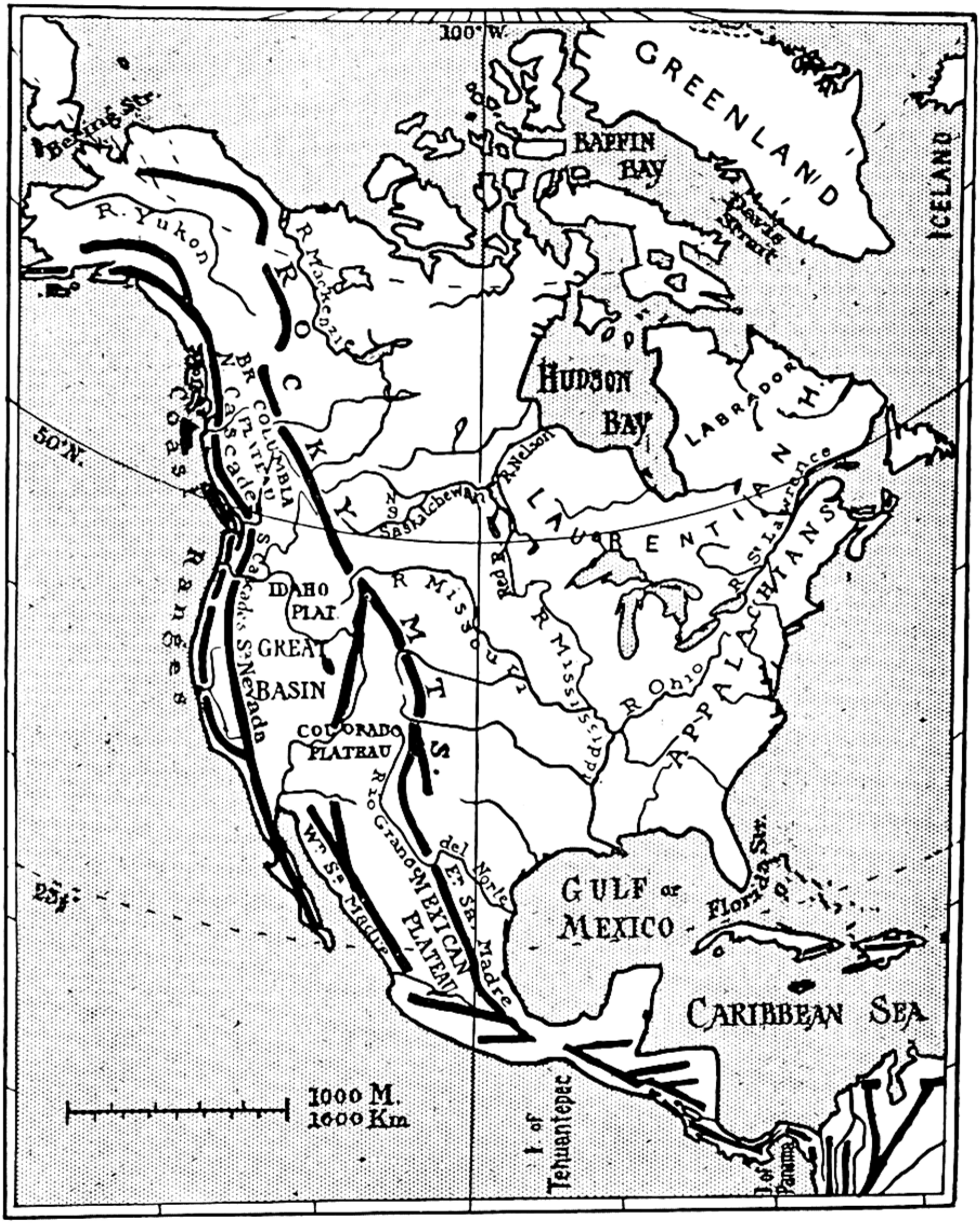


Fig. 76. Key to Relief of North America.

CHAPTER III

THE WESTERN CORDILLERA

1155. The Cordilleran Belt. The Cordillera consists of three main belts, which run from Alaska to the Isthmus of Tehuantepec: (i) the Eastern or Rocky Mountains, (ii) the Cordilleran Plateaus between the Rockies on the east, and (iii) the Pacific Ranges on the west. The earth movements which raise mountain systems last through long ages, and are accompanied by the rising and sinking of the crustal rocks, their folding and crumpling, their fracturing and faulting, and often by volcanic action. All these occurred on a great scale in the Cordilleran belt and make its structure very complicated.

1156. In so vast a mountain region, which measures 1,000 miles across at its broadest (latitude 40° N.), such terms as range, plateau, and valley must here be taken in a very broad sense. Both valleys and plateaus are crossed by lines of height, which though low relatively to the main chains, are high enough to divide them into different drainage basins.

1157. The Rocky Mountains. The Rocky Mountains, which were first seen, reached, and named from the east, rise bare, rocky, and almost treeless above the High Plains. They consist of folded ranges enclosing high valleys, and vary greatly in width. The Rockies form part of the Continental Divide of North America, but the Peace and Liard in the north, and the Missouri and some of its tributaries in the centre, rise beyond the eastern ranges, and break through them to the Mackenzie and Mississippi, which cross the Central Plains. The Rio Grande, in the south, also rises in the Cordilleran Plateau, and flows to the Gulf of Mexico, forming the frontier between the United States and Mexico.

The Missouri, with its tributaries the Yellowstone and Platte, the Arkansas, and many other rivers descend from the Rockies to the Mississippi. The sources of some are only a few hundred yards distant from streamlets which carry water down to Pacific Rivers.

1158. The Northern Rockies, sometimes called the Canadian Rockies, though they extend north into Alaska and south into the United States, stretch from Alaska to south of the Yellowstone. They reach over 13,000 feet in Canada, and show the typical Alpine scenery of a mountain region in the earlier stages of its history. The higher peaks are covered with snow, glaciers descend the valleys, rivers fall over high precipices in magnificent waterfalls, and the valleys contain long narrow lakes of great beauty. In the grandest part a region nearly as large as Wales has been set aside as a Canadian National Park. The easiest pass is the Yellowhead, in the extreme north, which is under 4,000 feet high, and crosses the Rockies where they narrow to a single range. The Kicking-Horse Pass, on the Continental or Great Divide (5,330 feet), carries the Canadian-Pacific line westward, and farther south the higher Crow's Nest and Kootenay Passes lead into mining districts.

1159. A long trough or furrow, crossed by low heights, runs for 800 miles between the Canadian Rockies and the Selkirk and other parallel ranges, which are part of an older mountain region. The Fraser, the Columbia, and its tributary the Kootenay rise in this long furrow, and flow to the Pacific by curious courses. The Fraser, and farther south the Columbia, flow north through the furrow, bend round the end of the Gold and Selkirk Ranges respectively in transverse valleys (§ 125) and flow south in valleys parallel to these ranges and to their upper valleys. Finally, they turn west and break through the Pacific Ranges in wild gorges shut in by high mountain walls. The Kootenay, which rises near the Columbia in the same furrow, reverses this course, flowing first south and then north in parallel valleys, and joining the Columbia below the beautiful Arrow Lakes. Such courses suggest that these parallel valleys were once drained by distinct rivers, which cut back transverse valleys through the softer rocks of the ranges between them, and finally became single rivers.

1160. The Yellowstone, in Wyoming, a volcanic region half as large as Wales, forms the United States National Park. It contains many geysers, hot springs, mud volcanoes, and other signs of volcanic activity, as well as striking examples of river erosion. The falls and the deep many-coloured gorge or canyon (Span. *cañon*) of the Yellowstone River are among its wonders.

1161. The Central Rockies. South of the Yellowstone, near the sources of the Platte River, the Rockies sink to 7,000 or 8,000 feet in the Laramie region. This is the easiest natural route from the Central Plains across the Cordillera, and was followed first by trails and later by the Union Pacific, the first transcontinental railway, which crosses the Great Divide at a height of 8,000 feet. South of this depression the Rockies reach their greatest height in Colorado, where Long's Peak, Pike's Peak, and many others exceed 14,000 feet. Many valleys are higher than the highest Swiss valleys, and in the western ranges form grassy or wooded parks, not unlike the Pamirs of Central Asia but much lower.

1162. The Southern Rockies. South of the Rio Grande the Rockies enter Mexico, forming the Eastern Sierra Madre, which is low in the north, but rises in the south to a great height above the Atlantic coastal plain.

1163. The Cordilleran Plateaus. A broad belt of high plateaus lies between the western ranges of the Rockies and the easternmost Pacific ranges. They recall the highest intermont plateaus of Central Asia. These plateaus, which are rugged and deeply cut by river gorges, are: (i) the Yukon Plateau, drained by the Yukon to the Bering Sea, which it enters by a great delta; (ii) the British Columbia Plateau, crossed by the Gold, Selkirk, and other ranges, and drained by the Fraser and Columbia; (iii) the Lava Plateau of Idaho, Oregon, and Washington, drained by the Snake north to the Columbia; (iv) the Great Basin, separated by the high fault scarp of the Wasatch Mountains (Lone Peak, 13,000 feet), from (v) the Colorado Plateau to the Wasatch. The Wasatch Mountains are continued by the Western Sierra Madre of Mexico, the high western margin of (vi) the Mexican Plateau. The Eastern and Western Sierra Madre are united in the south by a chain of giant active volcanoes, including Colima (14,200 feet), Popocatapetl (17,520 feet), Orizaba (18,250 feet), and several high extinct cones, which fall steeply to the Isthmus of Tehuantepec, the southern boundary of North America.

1164. The Yukon Plateau contains the Klondyke and other rich goldfields, and is a rugged region little known except along the routes to the mining districts. The British Columbia Plateau is described in § 1249.

1165. The Southern Plateaus show on a great scale the effects of erosion in very dry regions. The Lava Plateau is covered with immense flows of black basaltic lava, poured out from the volcanoes of past ages, and in places 4,000 feet deep. The Snake River has cut a canyon, over 2,000 feet deep, through the lava and through several hundred feet of the rock buried below it. Erosion in dry regions is at once slower and more rapid than in wetter regions. The rains fall at very irregular intervals, generally as violent thunderstorms, and sweep all the loose surface rock towards the edges of the watercourses. For a short time these boil with turbulent waters, which are loaded with rock fragments and erode their beds very rapidly. The weathering of the valley sides goes on much more slowly, for there is no constant downward movement of surface water and soil as in wet countries. The typical canyon of a dry region has almost vertical walls, several thousand feet high, often variously coloured as fresh layers of rock are exposed, and carved into pinnacles and buttresses where softer rocks have been eaten out. The Snake forms the fine Shoshone Falls in its descent from the highest part of the plateau to the Columbia.

1166. The Colorado Plateau is over 6,000 feet high and very dry, and the Colorado and its tributaries, the Green and Grand Rivers, have cut magnificent canyons across it. The Grand Canyon of the Colorado, in Arizona, is 200 miles long, and shut in by rock walls from 3,000 to 6,000 feet high. The river is so broken by rapids that it is almost impossible for a boat to go through it. Such rivers, deeply buried in their canyons, are useless for irrigation. Parts of the Colorado plateau are volcanic, and old hard masses of lava or of hard sandstones remain as small high tablelands, rising several hundred feet above the general level. They are known as mesas, and form the strongholds of Indian tribes (§ 1214, 16). Old lava plugs, like the Castle Rock of Edinburgh, also remain, and are called buttes.

1167. The Great Basin is a desert. It is crossed by many ranges, which divide it into a number of basins, each with its river ending in a salt lake. The region is too dry to have any outlet to the sea, though when it stood higher it was probably drained to the Snake River. Death Valley and Salton Sink are depressions which are several hundred feet below sea-level. There is more surface soil than might be expected, for the occasional storms bring down much rock waste from the higher ranges. This is left behind when the torrents evaporate, and weathers to finer soil, which is fertile where it can be irrigated. The lakes are salt when they have no outlet, and fresh when drained by a river, e. g. the Utah Lake, which is used for irrigation. The Great Salt Lake (2,000 square miles) is the shallow remnant of a lake which was once two-thirds the size of Scotland.

1168. The Mexican plateau, a high arid region, crossed by deep canyons, is described in Ch. VIII.

1169. The Pacific Ranges. These consist of two main chains, separated by a long valley, which has been submerged in the north and south. The eastern chain forms the St. Elias Alps of Alaska, and its submerged end forms the Aleutian Islands. The volcanic peak of St. Elias, with great glaciers on its flanks, reaches 18,000 feet, but is exceeded by Mount Logan (19,500 feet) and McKinley (20,300 feet), the culminating peak of North America. The St. Elias Alps are continued south through British Columbia as the Northern Cascades, which border the Pacific coast. The outer range has been submerged, forming Queen Charlotte and Vancouver Islands, and the sea has drowned the valley between the two ranges and filled the lower valleys of the Cascades, forming magnificent fiords and fine harbours. Puget Sound is the largest of these. South of Puget Sound the land has sunk less and both ranges are on the mainland. The Southern Cascades of the United States contain the magnificent peaks of Shasta,

CHAPTER IV

THE CLIMATE OF NORTH AMERICA

1171. Temperature of North America. North America stretches from polar to tropical latitudes, and varies in height from sea-level to nearly 3½ miles above it. It has therefore a great variety of climates.

1172. Figs. 78, 79 show the isotherms for January, the coldest month, and July, the warmest. They have been corrected for height (§ 48), and show what the mean monthly temperature would be if the whole continent were at sea-level. Notice in Fig. 78 how far south the isotherm of 32° F., the freezing-point, extends in January, showing that much of the continent has long frosts. Colour this isotherm blue, for it affects the distribution of plants and animals. A great part of the continent has an extreme climate, with cold winters and warm or hot summers, and is subject to 'cold snaps' in winter and 'heat waves' in summer.

1173. North America is in the latitudes of Eurasia, but does not extend so far towards the equator. The climate is broadly similar, but (i) North America is narrow, while Eurasia is very broad, and no part of North America is so far from the sea as the centre of Eurasia; and (ii) in North America the highest land is on the west and runs from north to south, while in Eurasia it stretches from east to west.

1174. The climate of the Pacific coast should be compared with that of Atlantic Europe and Africa in the same latitudes and wind belts. The climate of Eastern North America should be compared with that of Eastern Asia.

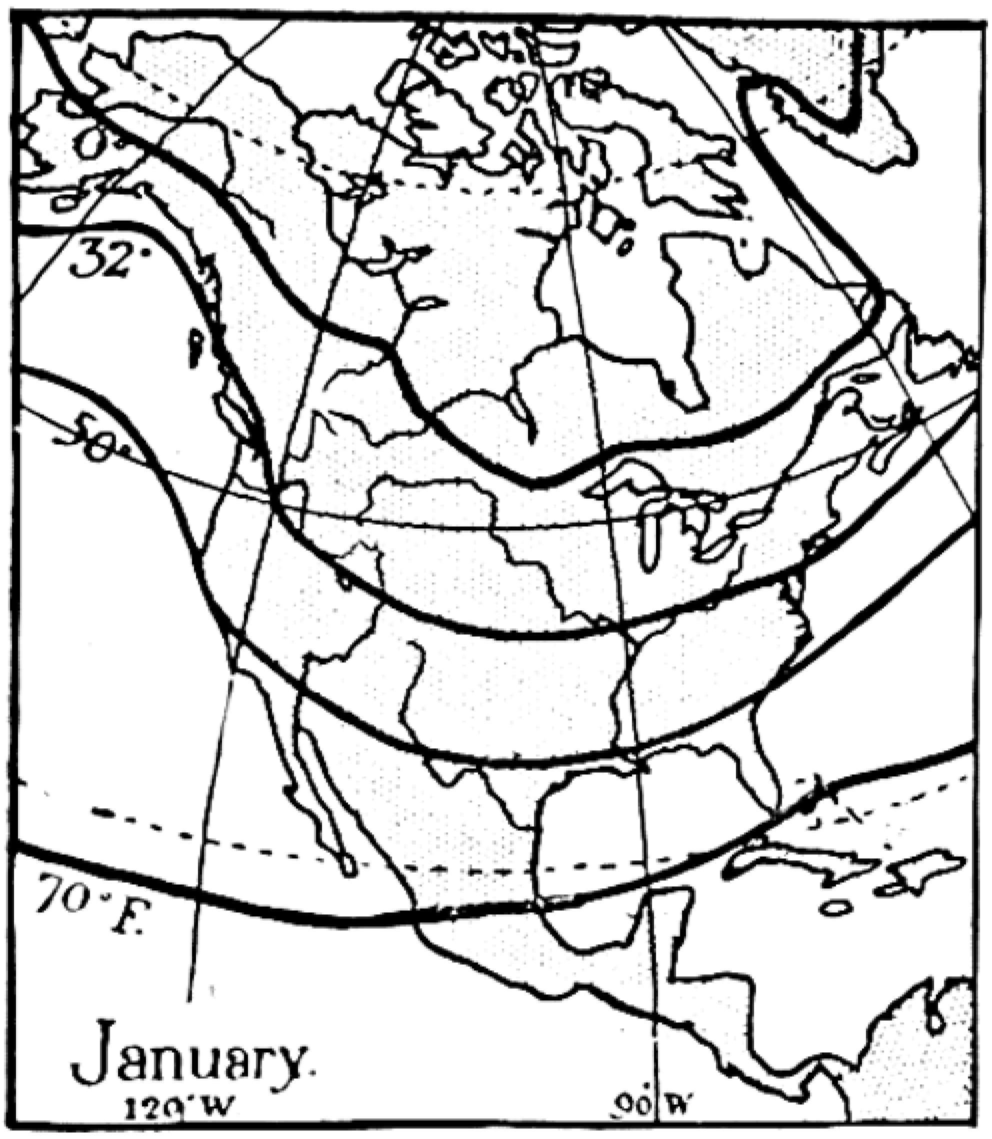


Fig. 78. January Isotherms of North America.

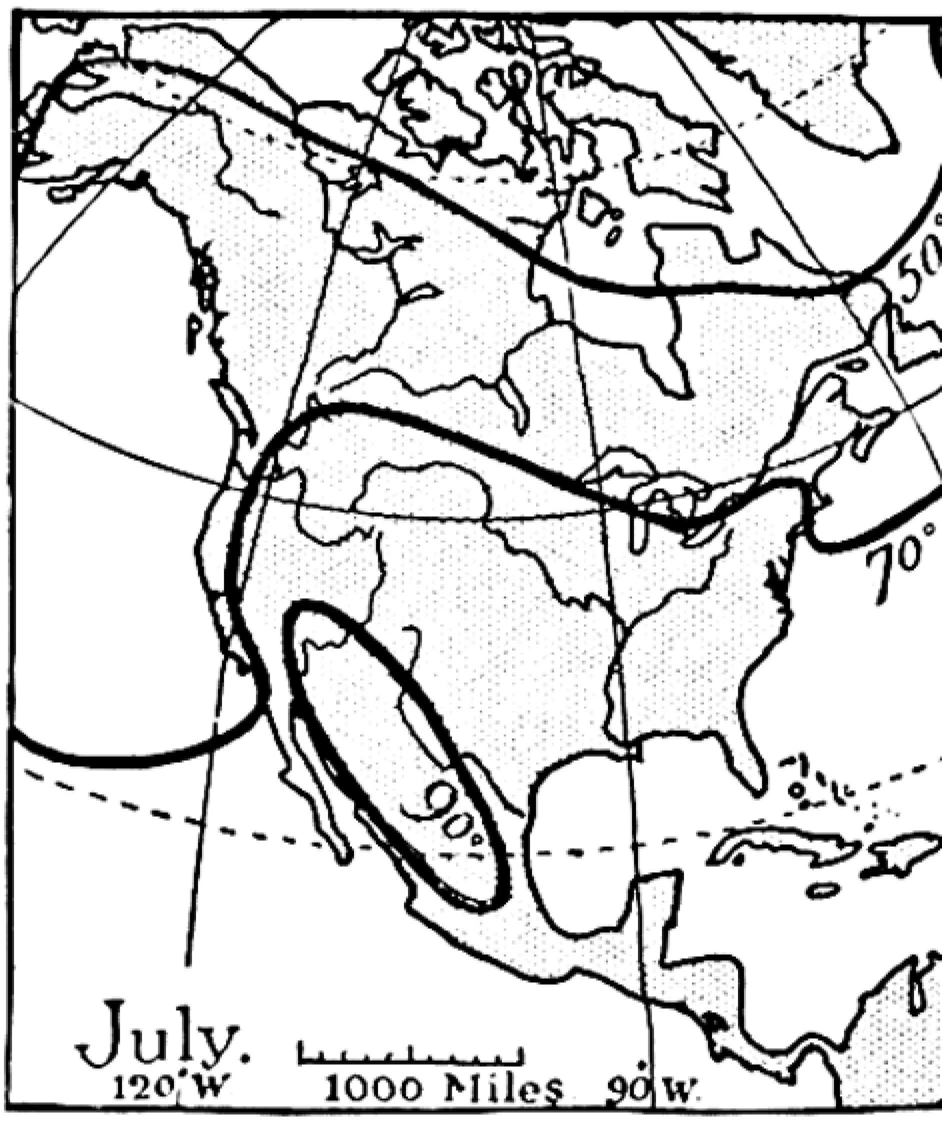


Fig. 79. July Isotherms of North America.

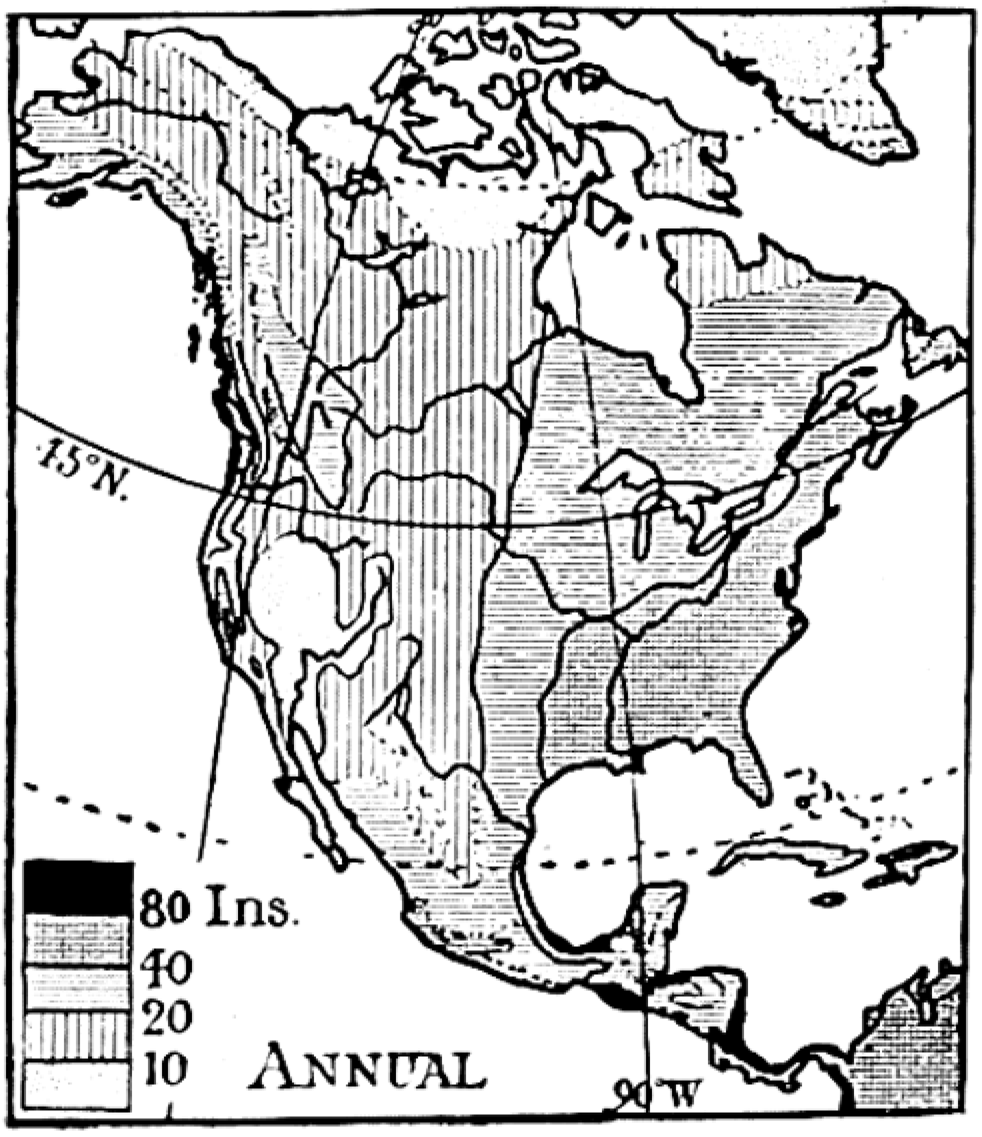


Fig. 80. Mean Annual Rainfall of North America.

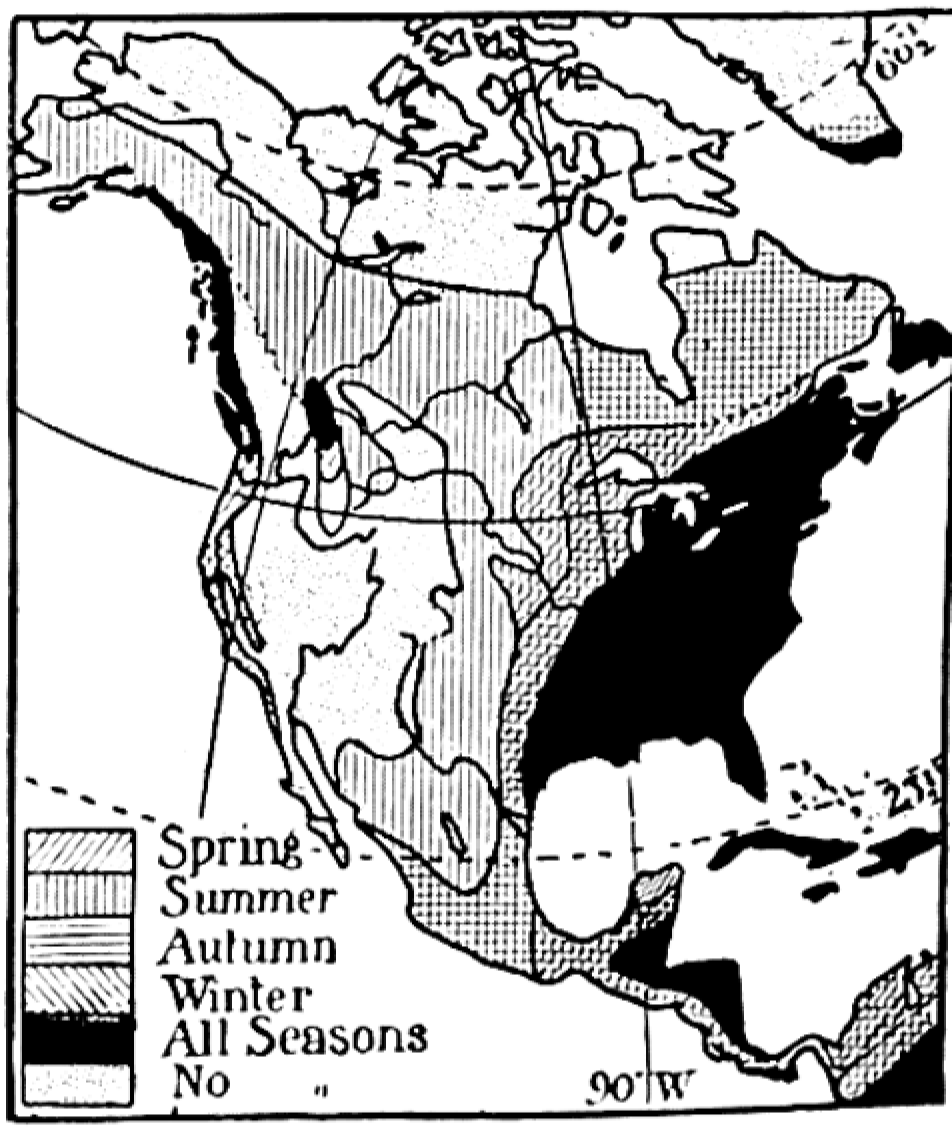


Fig. 81. General Distribution of Rain in North America.

1175. Compare Figs. 78, 79, which shows the isotherms for North America, with Vol. I, Figs. 108 and 139, which show them for Eurasia. In Europe the January isotherms tend to run from north to south, for the whole continent is in the belt of prevailing westerlies and deeply cut by seas on the exposed Atlantic margin. In Asia, which is remote from these influences, they run more nearly from east to west. The west coast of North America is not cut up by seas like the west coast of Eurasia, and is also much higher, and the influence of the prevailing westerlies is not felt far inland. Except on the Pacific coast, where they trend south, the January isotherms run on the whole from east to west, with a southward dip in the centre of the continent. The isotherm of 32° F. runs south along the west coast of British Columbia and east across the continent, just as the same isotherm in Eurasia runs south along the Norwegian coast, and east across Asia. There is nothing in North America corresponding to the region of intense cold round Verkhoyansk in Eastern Siberia, owing to the narrowing of the continent between Hudson Bay and the Pacific. The south of North America is a little warmer than Eurasia in the same latitudes in January, for the continent is deeply cut by the Gulf of Mexico.

1176. In summer the isotherms in both continents run more nearly east and west than in winter, and correspond more closely with the parallels of latitude. The most striking difference is that the belt of torrid heat, which is so large in Asia, is small in North America, owing to the narrowness of the continent in the trade-wind belt.

1177. The following figures show the mean winter and summer temperatures for various latitudes in North America, without any correction for height. As we should expect from the direction of the isotherms, they vary with the latitude both in winter and summer :—

Place.	Latitude.	Longitude.	Height in feet.	Coldest Month.	Hottest Month.	Mean Annual Rainfall.
Nain (Labrador)	56° 33′ N.	61° 41′ W.	13	−7·1° F.	47·5° F.	19·4 in.
Quebec	46° 48′ N.	71° 13′ W.	295	9·7° F.	65·7° F.	40·5 ,,
Portland (Maine)	43° 39′ N.	70° 15′ W.	128	21·9° F.	68·0° F.	1·43 ,,
Philadelphia	39° 57′ N.	75° 9′ W.	210	31·8° F.	75·7° F.	40 ,,
Charleston	32° 47′ N.	79° 56′ W.	23	49·3° F.	81·3° F.	53·5 ,,
Key West	24° 34′ N.	81° 49′ W.	75	68·7° F.	83·8° F.	37·8 ,,
Vera Cruz	19° 12′ N.	96° 8′ W.	50	69·6° F.	81·7° F.	67·9 ,,

All these places are on the east coast of North America, and show a steady rise of both summer and winter temperature from north to south.

Place.	Latitude.	Longitude.	Height in feet.	Coldest Month.	Hottest Month.	Mean Annual Rainfall.
Pt. Simpson	54° 34′ N.	130° 26′ W.	—	33·6° F.	58·9° F.	94 in.
Portland (Or.)	45° 32′ N.	122° 43′ W.	102	39·0° F.	66·4° F.	46·1 ,,
San Francisco	37° 48′ N.	122° 26′ W.	190	49·5° F.	59·4° F.	22·4 ,,
Mazatlan	23° 11′ N.	106° 25′ W.	250	66·7° F.	82·2° F.	31·4 ,,

These places are on the west coast. Comparing the figures, there is a marked difference between the east and west climates as far south as San Francisco. The west coast has much hotter winters and colder summers than the Pacific coast in the same latitudes. This is due to the prevailing westerly winds. The cold summer of Nain is due to a local cause, the cold Labrador current which brings down icebergs from the Arctic Ocean (§ 1186). The west coast is also wetter. The difference between the Atlantic and Pacific climates in these latitudes is well shown by the following figures :—

Place.	Latitude.	Longitude.	Height in feet.	Coldest Month.	Hottest Month.	Mean Annual Rainfall.
Portland (Me.)	43° 39′ N.	70° 15′ W.	128	21·9° F.	68·0° F.	43 in.
Portland (Or.)	45° 32′ N.	122° 43′ W.	102	39·0° F.	66·4° F.	46·1 ,,

The following places are in the centre of the continent:—

Place.	Latitude.	Longitude.	Height in feet.	Coldest Month.	Hottest Month.	Mean Annual Rainfall.
Fort Churchill (Hudson Bay)	58° 51′ N.	94° 10′ W.	37	−21° F.	34·3° F.	No Figs
Winnipeg . .	49° 24′ N.	97° 7′ W.	761	−7·1° F.	65·7° F.	21·4 in.
Chicago . . .	41° 53′ N.	87° 37′ W.	837	23·7° F.	72·3° F.	33·5 ,,
Indianapolis .	39° 46′ N.	86° 10′ W.	863	28·2° F.	76·5° F.	41·7 ,,
Vicksburg . .	32° 22′ N.	90° 53′ W.	292	47·0° F.	80·4° F.	53·9 ,,

Comparing them with places on the east and west coasts the winters are markedly colder than the winters of either, and the climate is more extreme. The winters of the east coast, like those of Eastern Asia in the same latitudes, are made colder by cold outflowing winds (§882).

1178. Rainfall. The chief causes affecting rainfall are (i) the prevailing winds, (ii) the height of the land, and (iii) the distance from the sea. Acting together, they explain the mean annual rainfall, which is shown in Fig. 80. Outside the tropics the wettest region is the Pacific coast of Canada and Alaska, which is always in the track of the westerly winds. Very heavy rains fall on the high windward slopes, but the lee slopes and the plateaus east of them are dry. The winds next reach the western slopes of the Rockies, which are wetter than the plateaus west of them but much drier than the coast ranges. The winds reach the High Plains as dry winds which bring little rain. The east coast is wet from Newfoundland southwards, but the rainfall diminishes from the high margin towards the interior. The east is much lower than the west, and the influence of the Atlantic winds is felt much farther inland than that of the Pacific winds. The eastern plains are consequently much less dry than the western plains. The rains of the east coast are brought either by east winds during the cyclonic storms of the North Atlantic (§§ 60, 64), or by the trade winds south of lat. 30°. Wet winds blow inland from the Gulf of Mexico for most of the year.

1179. Except in Canada the west of North America is drier than the east. Northern California has winter rains brought by the prevailing westerlies, but the Californian Peninsula, in the trade-wind belt, and on the lee side of the continent, is dry all the year. The driest regions of all are (i) the intermont plateaus in the trade-wind belt; and (ii) Arctic Canada, which is in the track of winds blowing outwards from the Pole towards warmer latitudes. Such winds are always dry.

1180. Fig. 81 shows the seasonal distribution of rain. The north is dry at all seasons. On the west coast the north has rain at all seasons, but most in winter. South of this a belt 500 or 600 miles long has winter rains only. The east coast has summer and autumn rains in the north, and rain at all seasons in the south. West of the Mississippi the rain, which is very scanty, falls chiefly in summer.

1181. Compare these maps with Part I, Figs. 111, 112, 141, 142, which show the mean annual rainfall of Eurasia, and its seasonal distribution. The heavy rains of the Pacific coast of Canada are due to the same causes as the heavy rains of Western Norway and the British Isles. The drier belt along the west coast, with winter rains only, corresponds with the Mediterranean lands of Europe and Africa. Both in North America and Eurasia the rainfall diminishes inland, and the interior receives most of its rain in summer. The dry belt of North America is much smaller than that of Eurasia, and the rainless regions, which form immense deserts in Asia, are represented in North America by an area only about twice as large as France.

1182. The following tables give the actual rainfall figures, (i) on the east coast; (ii) in the centre of the continent; and (iii) on the west coast in similar latitudes.

Place.	Latitude.	Longitude.	Height in feet.	Mean Annual Rainfall.
Quebec	46° 48′ N.	71° 13′ W.	295	40·5 inches.
Duluth	46° 47′ N.	92° 6′ W.	781	29·9 ,,
Helena	46° 34′ N.	112° 4′ W.	4,285	13·4 ,,
Portland (Or.)	45° 32′ N.	122° 43′ W.	102	46·1 ,,
New York	40° 43′ N.	74° 11′ W.	135	43·4 inches.
Chicago	41° 53′ N.	87° 37′ W.	837	33·5 ,,
Omaha	41° 16′ N.	95° 56′ W.	1,171	30·7 ,,
Cheyenne	41° 8′ N.	104° 48′ W.	4,285	11·9 ,,
Salt Lake City	40° 46′ N.	115° 54′ W.	4,396	15·7 ,,
San Francisco	37° 48′ N.	122° 26′ W.	190	22·4 ,,
Charleston	32° 47′ N.	79° 56′ W.	23	53·5 inches.
Vicksburg	32° 22′ N.	90° 55′ W.	292	53·9 ,,
Yuma	32° 45′ N.	114° 36′ W.	154	2·8 ,,
El Paso	31° 47′ N.	106° 30′ W.	3,710	9·5 ,,
Monterey	25° 40′ N.	121° 47′ W.	1,624	26·3 ,,

Helena, in Montana, in the east of the Cordilleran belt, in the same latitude as Quebec, has less than a third of its rainfall. The rainfall at Portland (Or.), which is only 100 feet above the sea, though heavier than at Quebec, gives no idea of the enormous rainfall on the high windward slopes of the Coastal Range.

1183. The second group shows the rainfall at points along the Union Pacific transcontinental line. There is the same decrease inland. Cheyenne, in the lee of the Rocky Mountains, is drier than Salt Lake City, in the Great Basin, where there is some evaporation from the surface of the lake. San Francisco, on the Pacific coast, in the Mediterranean belt of winter rains, is much drier than New York, on the Atlantic coast.

1183a. San Francisco is nearly 3° south of New York, but this is not the explanation of its drier climate, for Baltimore, lat. 39° 18′ N., long. 76° 37′ W., which is little more than 1° farther north than San Francisco, has the same rainfall as New York.

1184. The third group of figures show: (i) the heavy rainfall of the southern half of the east coast; and (ii) of the Lower Mississippi, which is reached by rainy winds from the Gulf of Mexico; (iii) the desert conditions of Arizona (Yuma) and New Mexico (El Paso); and (iv) the rainfall of the Mediterranean belt.

1185. Chinook Winds. Warm air can hold more moisture than cold air, and winds when chilled part with some of their water-vapour as rain. This explains the heavy rainfall on the windward slopes of mountains. On the lee side the winds descend into warmer layers of air, are warmed by compression, and can hold more moisture. Warm descending winds on the lee side of the North American Cordillera raise the temperature so much that snow quickly disappears. In Switzerland warm dry descending winds are called foehn winds, but in North America they keep their Indian name of chinook winds. Without them the climate of the Western Plains would be much more severe.

1186. Ocean Currents. The general circulation of the oceans has already been described (§§ 161–4). The Atlantic Ocean widens in tropical latitudes to the almost land-locked Caribbean Sea and Gulf of Mexico, into which the surface waters of the North Atlantic are driven by the north-east trade winds. The surplus waters escape through the Strait of Florida, between Florida and Cuba, into the Atlantic, where they join a warm current which flows north outside the West Indies. This warm and relatively salt current is called the Gulf Stream. It can be traced along the east coast for a long distance, but north of Cape Hatteras, midway between the Strait of Florida and the St. Lawrence, it becomes a general surface drift and is blown west towards the coasts of Europe by the prevailing westerlies.

1187. A current of cold polar water, driven south by north winds, sets south along the east coast of Labrador and Greenland. It meets the Gulf Stream Drift off Newfoundland, and being colder and heavier sinks beneath it. This causes dense fogs off Newfoundland, which are the more dangerous because these currents carry many icebergs south. The cold surface waters, like the Gulf Stream Drift, are blown east by the prevailing westerlies, but cold water, known as the 'cold-wall', is found south of Newfoundland as far south as Cape Hatteras. This is explained by the fact that off-shore winds blow the surface waters onwards and cooler surface water from below replaces them.

1188. In the Pacific Ocean the surface waters also become heated between the tropics. Part of this warm water is driven west by the trade winds towards the coast of Asia, and then east towards the coast of British Columbia by the westerly winds. This warm drift keeps the coast of British Columbia free from ice when the eastern ports in the same latitudes are closed. There is no well-marked polar current through the narrow Bering Strait, but the cooler waters of the North Pacific Ocean are driven south in the trade-wind belt and form a cool current along the Californian coast.

1189. Climate and Natural Regions. A detailed comparison of the climate maps and of the actual figures given throughout Parts III, IV, V, and VI shows that the natural regions of North America must be the same as those of Asia. It must not be forgotten, however, (i) that the Pacific coast of North America corresponds with the Atlantic and not with the Pacific coast of Eurasia, and the Atlantic coast with the Pacific coast; (ii) that the continents differ greatly in size, height, and other physical features; and (iii) that man has modified the natural regions of Eurasia, especially in the west, more than in North America. The natural regions of both continents are (i) tundra in Arctic latitudes; (ii) forests on the wetter parts of the temperate belt; (iii) steppes, called prairies in North America, in temperate latitudes where the rainfall is too small for forest trees; (iv) scrub, and (v) desert in drier areas, whether temperate or tropical; and (vi) tropical forests, savanas, and scrubs. British Columbia may be broadly compared with Britain and Southern Scandinavia, California with the Mediterranean lands of Europe and Northern Africa, Central and Eastern Canada with Siberia, the prairies of Canada and the United States with the steppes of European and Asiatic Russia, the dry intermont Cordilleran plateaus with Iran, and the Eastern United States with China.

Exercises

1. What is meant by saying that an isotherm has been corrected for height? What is the reason for doing this?
2. Compare the climate of North America with that of (*a*) Europe, and (*b*) Asia.
3. Construct a table of observations to show that the interior of North America has a more extreme climate than either the Atlantic or Pacific coast in the same latitude.
4. Peking and New York are in almost the same parallel of latitude. Show by a table the resemblances and differences between their climates (§§ 684, 1262). Add any explanations you think necessary.
5. Divide North America into natural regions, and compare them with those of Eurasia.

CHAPTER V

PLANTS, ANIMALS, AND MAN

1190. Comparing North America with Eurasia we find that the Arctic circle cuts both near the north coast, and that the breadth of tundra is very similar in both. San Francisco on the Pacific coast, and New York on the Atlantic coast, are almost in the latitude of Peking in China. The climate of New York is not unlike that of Peking, for its temperatures are reduced in winter by cold outflowing winds from the cold interior of the continent. The Tropic of Cancer crosses Mexico and the West Indies in North America, and Central India and Southern China in Asia. The extreme south of Ceylon is as far from the equator as the south of Central America. So far as distance from the equator affects plants, Asia and North America are very much alike.

1191. The Tundra or Barren Grounds. The Barren Grounds of North America differ little from the tundra of Asia (§ 703). The desolate flats along the Arctic Ocean are covered with snow for many months, and even in summer the soil thaws for a few inches only. Reindeer moss, lichens, and low berry-bearing bushes are the chief plants. In lower latitudes dwarf trees appear in sheltered valleys as bushes a few inches high, and pass on the south into cool temperate forests.

1192. Forests. In Eurasia forests once covered most of Northern and Central Europe, but have been cleared except on the highlands. They still remain in Russia and in Siberia south of the tundra. South China has forests of laurel, magnolia, and camellia.

1193. Similar forests are found in the corresponding regions of North America: (i) coniferous forests (pine, fir, spruce, larch, cedar) in the north, corresponding to the northern forests of Russia and Siberia; (ii) deciduous forests in the centre; and (iii) evergreen forests of the Chinese type in the south. The deciduous

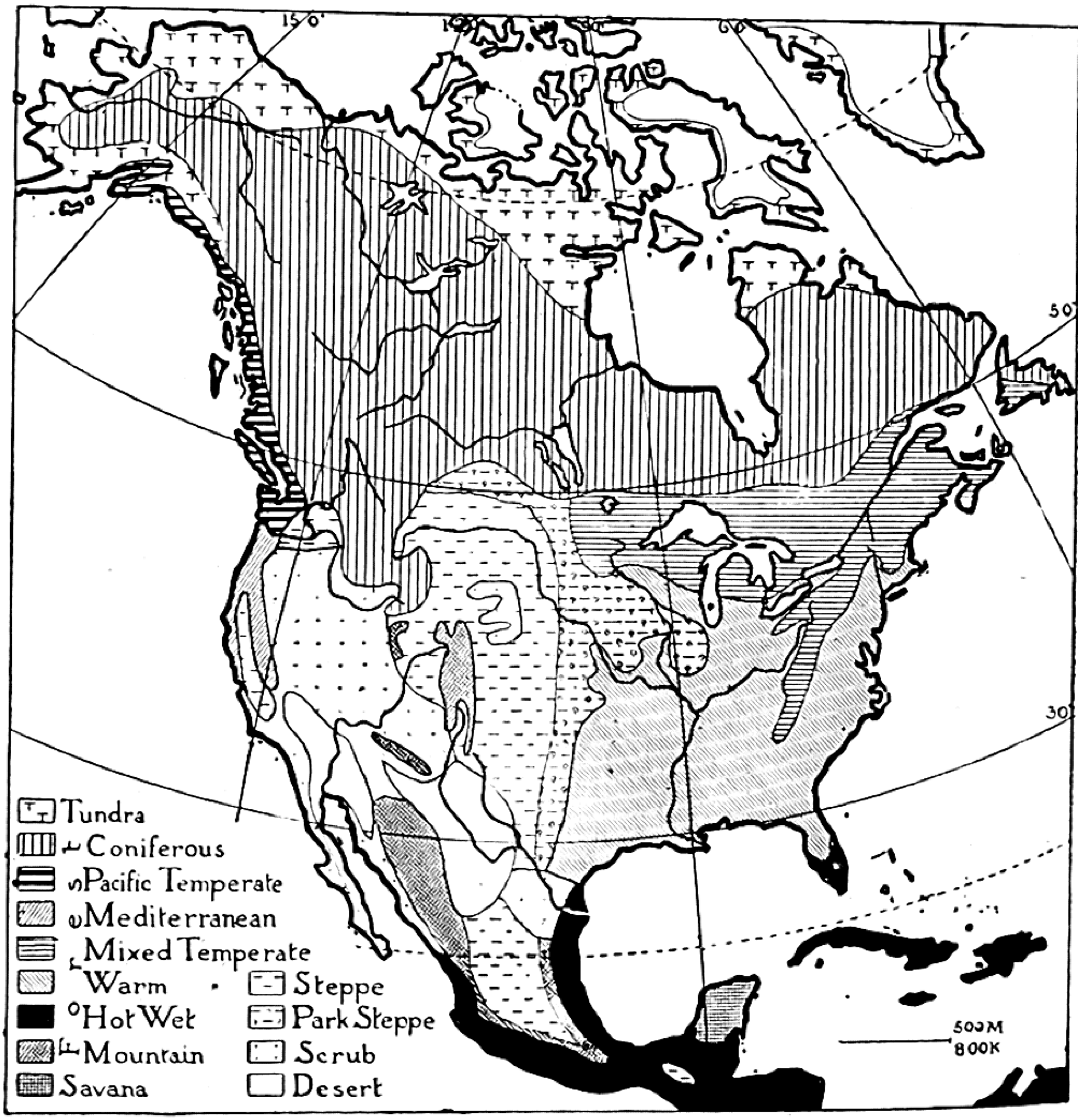


Fig. 82. The Natural Vegetation of North America.

forests contain trees of many species, which put on gorgeous red and gold colours in the autumn or 'fall.' The splendid colouring of the Virginian creeper, so called from its America home, is familiar to every one. The maple, with its crimson leaves, is the national emblem of Canada. On the Pacific coast coniferous forests are found on the wetter slopes. In British Columbia the Douglas fir grows to 300 feet, and the redwoods of the Californian forests are almost as large.

1194. The existence of forests and giant trees in high latitudes is understood if it is remembered that in colder lands evaporation goes on slowly, and nearly all the rain sinks into the ground. The winter snow not only protects the roots in winter, but supplies moisture when it thaws in spring. The summers throughout the forest belt are fairly warm, and most forest trees can endure a cold winter if they have warm summers and abundant moisture.

1195. The Prairies. Lake Winnipeg marks the eastern limit of the Atlantic forests. West of them are rolling grassy prairies, rising gradually to the High Plains at the base of the Rockies. The prairies correspond with the steppes of the Old World. They may once have been forested in the wetter parts, but fires in the dry season have helped to keep them treeless.

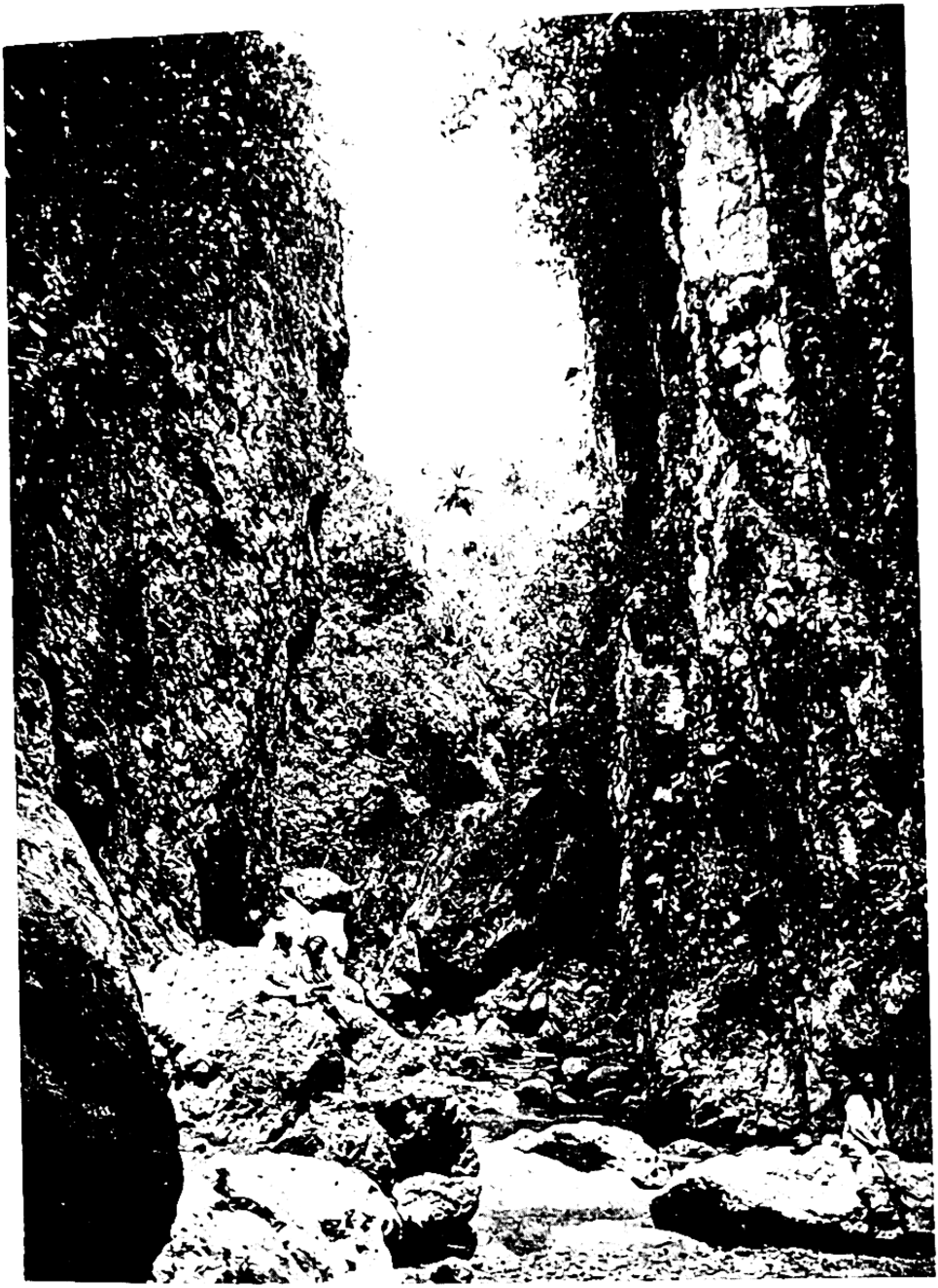
1196. North America has few important native cultivated plants, except maize or Indian corn, but all the European cereals have been introduced. The treeless prairies require no clearing, and are so level that steam- and motor-ploughs and reapers can be used. The melting snow in spring supplies moisture, the summer rains fall when most needed, and the warm dry autumns ripen the grain. Wheat-growing is even more important than in the Old World steppes.

1197. For farming purposes the prairies are divided into (i) the wheat belt in Canada and the northern United States, (ii) the maize belt farther south, and (iii) the cotton belt in the extreme south. Maize can be grown only where the climate is dry and there are no late frosts. In the cotton belt rice and sugar are cultivated, and tobacco is grown from the St. Lawrence to the Gulf of Mexico.

1198. The Western Plains. The western prairies were once thought too dry for wheat, and stock-raising was the chief occupation. They are now being brought into cultivation, and much attention is paid both to irrigation and dry farming. In dry farming the surface soil is constantly worked, and kept finely pulverized, to prevent evaporation. Alfalfa, a kind of clover, also called lucerne, is one of the most valuable crops in a dry region. Its deep roots go far down in search of water, and it yields several crops in a season.

1199. The South-west United States are little better than a desert covered with tufts of dry sage-brush, or with the cactus, which has reduced its leaves to small thorns, and stores water in its strangely shaped swollen stems. It is of many varieties, shapes, and sizes, and is specially common on the Mexican Plateau (Fig. 106).

1200. The Tropical Lands. The tropical vegetation of the coastal plains of Mexico, Central America, and the West Indies is like that of Ceylon and the Malay Peninsula. Mahogany, and many other beautiful woods, rubber and other tropical plants, grow in the hot wet forests, and sisal hemp is important in the drier parts, especially in Yucatan. Sugar, coffee, cacao, and all other tropical crops can be grown in the hot belt, and temperate crops, e.g. wheat and potatoes, at a height of a few thousand feet.



Photograph by Underwood & Underwood.

Fig. 83. Tropical Vegetation in the West Indies.

This gorge is near Kingston, Jamaica. Compare this with Fig. 41, showing the tropical vegetation of Central Africa.

1201. Animals. The animals of the New World resemble those of the Old World, suggesting that a former land connexion once existed (§1202). This was broken before the existing animals had developed from their common ancestors. The horse developed in the Old World, but not in the New, though fossil ancestors of the horse are found in America. Similarly, the musk ox of the New World is known only as a fossil form in the Old World. All the domestic animals of the New World, except the turkey, a native of America which is now common in Europe, were introduced by European settlers. They multiplied rapidly, and herds of wild horses and almost wild cattle roamed over the prairies.

1202. Tundra Animals. These are very similar in the Old and New World, (i) because the land connexion was closer, and (ii) because some polar animals drift on ice floes, (iii) swim through the seas, or (iv) fly across them. Tundra animals must be able to live through a long cold winter when food is scarce, and consequently they have thick coats of fur, and migrate readily in search of food. Many protect themselves against animal foes by becoming white in winter to match the snow; e.g. the Arctic hare, and the ptarmigan or snow grouse.

1203. In every region animals form two groups, (i) grazing, and (ii) those which prey on other animals. The caribou, moose, and musk ox are the largest grazing animals of the tundra. The moose corresponds with the elk of the Old World and the caribou with the reindeer. Domesticated reindeer have been introduced from Asia in recent years. The musk ox has so thick a coat that it can endure a temperature of —80° F. without ill effect. The chief carnivorous animal is the wolf, which is found throughout the tundra, except in Greenland. The Eskimo dog, a domesticated wolf, eats every kind of food—skins, fish, shell-fish, and even seaweed—and can thus live through times of great scarcity. Some animals become dormant in winter, much as plants do in cold or dry seasons. Mosquitoes are found in millions in the tundra, breeding in spring in the thawing swamps. Birds are numerous, but most of them are summer visitors which come north to breed in safety. Polar bears, walruses, seals, and whales live in the polar waters, or on the ice floes. They are hunted for their skins, flesh, and oily fat, while some whales yield whalebone.

1204. Forest Animals. The coniferous trees keep their leaves in winter, and beechmast, bark, seeds, berries, &c., are so abundant that many tundra animals, e.g. the caribou, migrate towards the forest in winter. The deer is a typical forest animal, and is often dappled to match the trunks and leaves. North American deer include the caribou, the wapiti or red deer, and the Virginian deer with its great antlers. The wolf, the lynx, the puma, the grizzly, brown, and cinnamon bears, found chiefly in the Rocky Mountains, are the larger beasts of prey. The smaller ones include the fox, weasel, stoat, badger, &c. The skunk, protected by its offensive smell, is peculiar to the New World. Of the innumerable fur-bearing animals the most interesting is the beaver, which builds dams across the forest streams, and makes complicated houses or lodges.

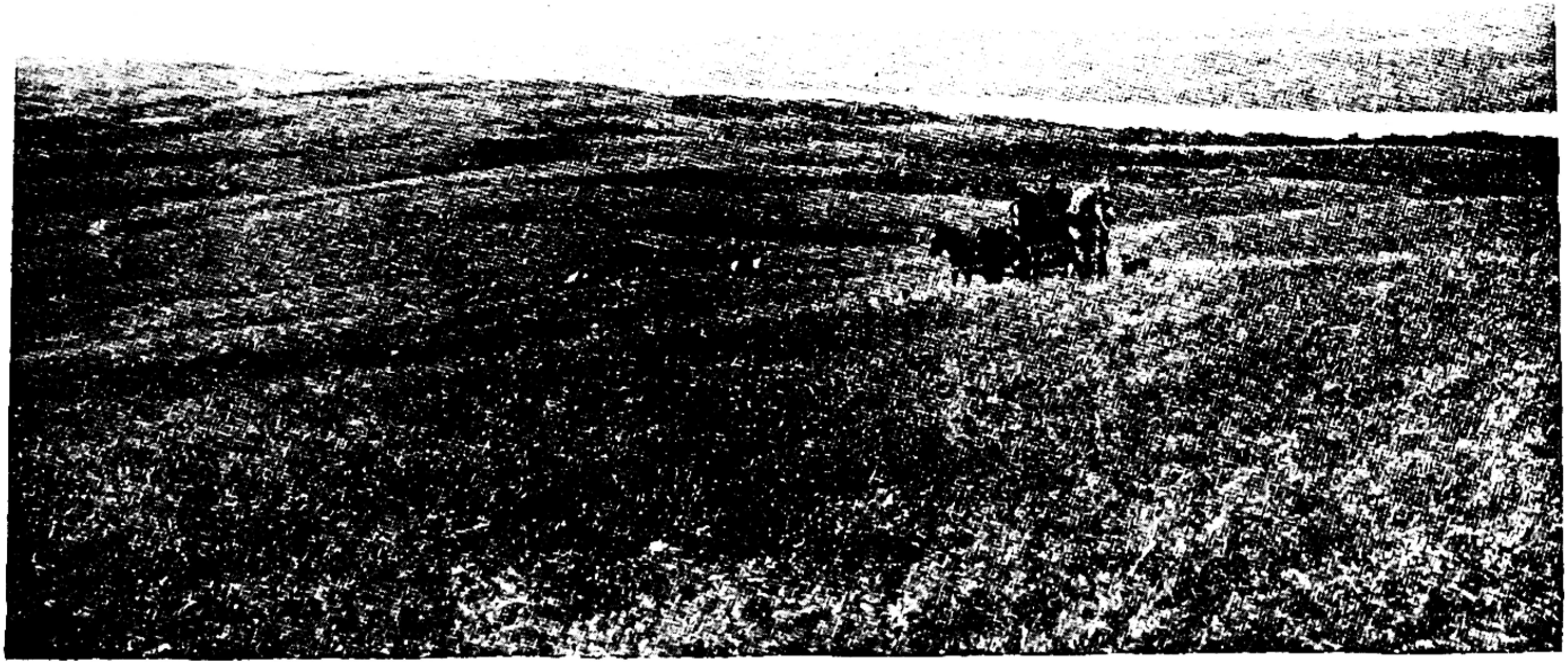
1204 a. Many animals have learned the value of social life as a protection, e.g. the caribou and most grazing animals, the beaver, &c. Beasts of prey take to it less readily, but wolves and wild dogs hunt in packs.

1205. Prairie or Steppe Animals. The prairie, like the steppe, yields abundant food in summer, but is almost as barren as the tundra in winter. Its animals consequently migrate readily, and generally in great herds. Neither the camel, wild horse, ass, or true goat were found in the steppes of the New World, where the chief grazing animal was the bison, a near relative of the buffalo. Sixty years ago the bison numbered millions, and a single herd might form a column 25 miles in breadth. The white settlers killed them off in twenty years, to obtain grazing land for domesticated animals. Other wild animals are the spring buck, a kind of antelope, the big-horn wild sheep of the Rockies, and the puma. Wild dogs and gophers are common in the drier prairies.

1206. Animals of the Tropical Forest. These resemble those of the Old World, but are less numerous. Monkeys and parrots are tree-dwellers, but there are no great apes like those of Africa or Borneo (§§ 713, 938). Venomous snakes are common, and stinging or biting insects spread disease. The alligator of American rivers is closely related to the crocodile of the Old World.

1207. Fisheries. Many fish live in the North American seas, especially where cold currents bring down abundant organic food. Cod were so numerous off the lands washed by the Labrador current, that their shoals are said to have delayed Cabot's ships. The lobster and oyster fisheries are very profitable, and delicious fish are caught in the Great Lakes (blue fish, white fish, &c.) and in many rivers. Corals and sponges abound in the warm tropical seas. On the Pacific coast the halibut fishery is very productive, and the rivers, like those of the Atlantic coast, swarm with salmon.

1208. Occupations. North America, when discovered, was thinly peopled, and hunting was the chief occupation. Red Indians hunted bison, which were so abundant that only the tongue was eaten. The skins were used for tents or wigwams, for clothing, for the noiseless shoes called mocassins, and the sinews



Photograph by C. W. Mathers.

Fig. 84. The Canadian Prairie.

The river shown is the Saskatchewan. Notice the almost level grassy surface. Compare this with Fig. 9, which shows the prairie turned into wheatfields.

for bowstrings. After the Spaniards introduced horses the Red Indians rode wild horses barebacked, and were formidable enemies to the white settlers. Their numbers were decreased by wars and the extermination of the bison. They are now allotted reservations in the drier prairies, but are dwindling. The caribou is still hunted by Indian tribes in the Barren Grounds.

1209. The forest Indians lived by fishing as well as hunting, and invented the birch-bark canoe, a strong light boat, which draws little water and is easily carried. They made their way through the network of forest waterways, carrying their boats across the low divides. The birch-bark canoe suits life in the forests and the Barren Grounds so well that it is still used, and rolls of birch bark are sold at every trading station in the north.

1210. In Mexico the Aztec civilization had advanced much farther, and irrigation and agriculture were practised. Art and science were cultivated, and many fine decorated monuments remain. Silver was mined and its abundance roused the greed of the Spanish conquerors, who wiped out this interesting civilization.

1211. Outside Mexico the European settlers found a virgin land, only fitted for primitive occupations. The cod fisheries of the east coast at once became important. The fur trade attracted adventurers inland, and French trappers made their way in canoes over the interior. Canada is still a great fur country, and the Hudson Bay Company has trading posts all over Northern Canada. The clearing of the forests for agriculture led to the growth of the timber or lumber trade. The trees are felled in winter, floated down the swollen streams in spring, and sawn in mills worked by water power or electric power generated by the rivers. Poor timber is made into wood pulp, pulp ware, paper, &c.

In the United States settlement began earlier and clearing has advanced farther. Agriculture is the principal occupation of North America east of long. 100° W., but farther west the dry climate suits grazing better. Immense numbers of cattle, horses, and sheep are now kept on the old grazing grounds of the bison. Mining is important both in the east and west. Iron, coal, and copper are abundant in the east. Settlers were attracted west by the discovery of gold from California to the frozen Yukon, and coal, copper, silver, lead, &c., are found in the same region.

1212. Manufactures grew rapidly last century, as population increased and raw material was more easily obtained by rail. The Eastern United States are now one of the great manufacturing regions of the world, and manufactures are growing in Eastern Canada. The west produces wheat and meat for the east and buys its manufactured goods. Each extension of agriculture leads to a growth in manufactures, e.g. the manufacture of farming machinery on a vast scale.

1213. Much food is exported to the Old World, and timber from the Pacific coast is sent as far as Australia. Food is perishable, and this explains why salmon-canning is important on the Pacific coast and 'meat-packing' in the meat cities of the prairies.

1214. Canada was originally settled from France, the Eastern United States from Britain, and the Gulf lands from Spain. Canada has a large French-speaking population in the east, though elsewhere it is English-speaking. The United States is much more mixed, and now draws most of its immigrants from eastern and southern Europe. The coloured people, descended from African slaves, form about one-tenth of the population, and outnumber the whites in some of the Southern States. In Central America, Mexico and the States adjoining it are inhabited by people of Spanish descent.

1214a. The Eskimo of the tundra, a coastal people, depending mainly on the sea for food, have brought their canoes, or kayaks, and their weapon, the harpoon, which is thrown and recovered, to great perfection. Both are made of materials supplied by the animals they kill, and of drift wood washed up by the sea. The Eskimo live a wandering life, and use sledges drawn by dogs on land. Their summer home is a skin tent, and their winter dwelling a hut of snow. Skins and furs are used for clothing, and the blubber or oily fat of whales, seals, &c., for warmth and light.

1214b. Several Indian tribes live in the arid regions. The Pueblo Indians have converted the mesas (§ 1166) into strongholds, with houses several stories high, reached only by ladders. They grow maize and other crops by irrigation, and use skins, cotton, and the fibres of desert plants for clothing. The agricultural Papagos, or 'bean-Indians', do not irrigate the land, but plant beans and maize after rain. They can live for two or three days without water, and run incredible distances. Such habits are invaluable to a desert people.

1214c. Other typical arts practised by the desert Indians are basket-making in the drier parts, and blanket-making in the wetter parts. The basket-making Indians use the fibres of grass, cactus, &c., and the women weave them into watertight vessels and decorate them with traditional colours and patterns. These baskets are used as cradles for babies, for holding water, and even for boiling food by putting in water and hot stones. The blanket-making Navaho Indians of Arizona and New Mexico lead a wandering life, living in rude houses made of rough timber or mud. In the better parts they keep sheep and goats, and weave the wool on primitive looms into blankets, which are so warm and lasting that white traders are glad to exchange tobacco, tinned food, and other luxuries for them.

Exercises

1. Show how (*a*) the plants, (*b*) the animals, and (*c*) the human inhabitants adapt themselves to the geographical conditions of the tundra.
2. Compare in detail the American prairies and the Asiatic steppes with regard to (*a*) natural vegetation, (*b*) cultivated plants, (*c*) wild and domesticated animals, and (*d*) the life of the original inhabitants.
3. Which parts of North America are best fitted for (*a*) the date-palm, (*b*) rice, (*c*) the vine, (*d*) cotton, and (*e*) tea? Give the reasons for your selection.
4. Classify the occupations of North America, either by a map or otherwise.

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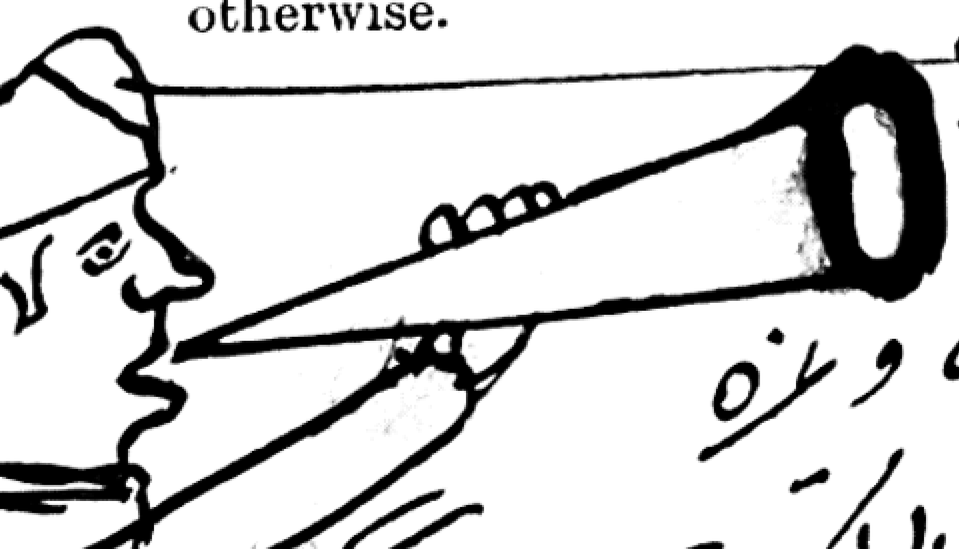


پھر نہ تک ہمیں جھر نہ ہوں؟
ہری سنگھ جی مہاراج ڈیرہ دون
بیکل قبل کل جھلک کی تاب نہ لا کر جھول جلا گیا

CHAPTER VI

NEWFOUNDLAND AND CANADA

1215. British North America. British North America consists of (i) Newfoundland, (ii) the Dominion of Canada, (iii) the Bermuda Islands in the North Atlantic Ocean, 1,000 miles north of the West Indies.

1216. Newfoundland. Newfoundland (42,000 square miles) is an island rather smaller than England, lying at the mouth of the St. Lawrence. It is cut off from Labrador (20,000 square miles), which is politically part of it, by Belle Isle Strait (12 miles), and from Cape Breton Island by Cabot Strait (160 miles). The eastern coast of Newfoundland has sunk, forming long peninsulas, high cliffs, deep fiords, and fine harbours. The long fiords of Trinity and Placentia Bay almost cut it in two. An area larger than that of the present island is covered by seas less than 600 feet deep, forming the Banks of Newfoundland, the richest fishing grounds in the world. The sunken eastern coast of Labrador is also deeply cut by fiords. These coasts are washed by the cold Labrador current, which meets the warmer waters of the Gulf Stream Drift off Newfoundland, causing dense fogs. Both Newfoundland and Labrador have been much glaciated, and are covered with moraines and glacial lakes. Labrador reaches 5,000 feet, but Newfoundland does not exceed [illegible],000 feet. The surface consists of moors and pine forests, with fertile valleys in Newfoundland. Coal, iron, copper, gold, and nickel are worked in Newfoundland.

1217. Newfoundland, like Norway, has many fine harbours, rich fisheries, and a relatively poor interior. In both fishing is the chief occupation. Thousands of seamen visit the Labrador coast in March and April for the seal and whale fisheries. When these are over they return to Newfoundland for bait fishing, and for the cod fishery, which is at its height in winter. Cod are dried and salted for export, as in Norway, and cod-liver oil is made. The salmon and lobster fisheries of the rivers and coasts are also important.

1218. As in Norway, the sea is more used than the land for traffic, but railways are growing and the inland resources are being developed. Paper-making from wood-pulp is the most important. The capital and largest town is St. John's, on the east coast, only 1,650 miles from the Irish coast, on the shortest possible sea route.

1218a. France retains St. Pierre and Miquelon, two small islands off Newfoundland Banks, as fishing centres.

1218b. Labrador is little known except along the high fiord coast, which is ice-bound except for a few months in summer. The permanent population, mainly Eskimo, is about 4,000, and famine is common if the fishing season is poor. Domesticated reindeer have lately been introduced by missionaries, as an additional source of food and transport.

1219. Canada. Canada is nearly as large as Europe, (3,600,000 square miles), and is not divided from the United States by any natural frontier. Its physical divisions are continuous with those of the United States (Chaps II, III and § 1261) and consists of (i) the Laurentian Highlands in the east, (ii) the prairies in the centre, and (iii) the Cordilleran region in the west. Administratively, it is divided into (i) the Maritime Provinces, Nova Scotia, Prince Edward Island, and New Brunswick; (ii) the Laurentian Provinces, or Eastern Canada, Quebec, and Ontario; (iii) the Prairie Provinces, Manitoba, Saskatchewan, and Alberta; (iv) the

Cordilleran Provinces, British Columbia in the south, and Yukon in the north; and (v) the North-western Territories in the tundra. In 1911 the population was over 7,000,000, an increase of nearly 2,000,000 in ten years. Five millions of these live in the St. Lawrence basin.

1219 a. The boundaries of the newer provinces vary as settlement extends. Part of Keewatin ('the land at the back of the north wind'), round Hudson Bay, is now included in Ontario and Manitoba, and Saskatchewan and Alberta will absorb part of the North-west Territories.

1220. Climate. Canada extends from within the Arctic circle to the latitude of Rome. Little was known of the interior and west until recent years, and the cold winters were believed to make the land unfit for settlement. It is now known to be one of the richest new lands in the world, and particularly fitted for growing wheat. The climate is continental, especially in the interior, but the coasts, more particularly the Pacific coast, have an equable climate and abundant rain.

Place.	Latitude.	Longitude.	Height in feet.	Coldest Month.	Hottest Month.	Mean Annual Rainfall.
Anticosti .	49° 53′ N.	63° 36′ W.	20	12·6° F.	57·2° F.	—
St. John's	47° 34′ N.	52° 42′ W.	150	23·7° F.	59·9° F.	55·1 in.
Sydney .	46° 10′ N.	60° 10′ W.	37	21·2° F.	63·3° F.	—
Halifax .	44° 39′ N.	63° 36′ W.	95	21·9° F.	64·8° F.	54·7 ,,

These figures show the equable moist climate of the Maritime Provinces. Fuller figures would show that their exposed Atlantic coasts were wetter than their west coasts.

Place.	Latitude.	Longitude.	Height in feet.	Coldest Month.	Hottest Month.	Mean Annual Rainfall.
Fort Churchill	58° 51′ N.	94° 10′ W.	37	-21·0° F.	34·3° F.	—
Moose Factory	57° 15′ N.	80° 5′ W.	33	- 3·6° F.	61·7° F.	29·4 in.

These figures show the climate of the thinly settled coast of Hudson Bay, a region which will grow in importance as a summer route for exported wheat.

Place.	Latitude.	Longitude.	Height in feet.	Coldest Month.	Hottest Month.	Mean Annual Rainfall.
Quebec . .	46° 48′ N.	71° 13′ W.	295	9·7° F.	65·7° F.	40·5 in.
Montreal .	45° 30′ N.	73° 35′ W.	187	12·4° F.	68·9° F.	41 ,,
Port Arthur	48° 27′ N.	86° 12′ W.	643	4·8° F.	62·0° F.	—
Winnipeg .	49° 24′ N.	97° 7′ W.	761	−7·1° F.	65·7° F.	21·4 ,,
Calgary . .	51° 10′ N.	114° 2′ W.	3,390	12·4° F.	60·3° F.	14·9 ,,
Victoria . .	48° 24′ N.	123° 19′ W.	72	37·9° F.	59·9° F.	37·7 ,,

These places are on the Canadian Pacific line, the building of which led to the rapid settlement of the prairies. Except on the west coast the winters are cold, but the summers are warm, and the rain falls chiefly in summer. This allows wheat to be cultivated in very high latitudes. Compare these figures with those in the following table, which are on or near the more northerly Grand Trunk Pacific line, now being built :—

Place.	Latitude.	Longitude.	Height in feet.	Coldest Month.	Hottest Month.	Mean Annual Rainfall.
Edmonton .	53° 33′ N.	113° 30′ W.	2,160	6·4° F.	61·7° F.	13·9 in.
Port Simpson	54° 34′ N.	130° 26′ W.	—	33·6° F.	58·9° F.	9·4 ,,

This shows that the wheat-growing region, with warm summers and summer rains, is likely to extend northwards.

Place.	Latitude.	Longitude.	Height in feet.	Coldest Month.	Hottest Month.	Mean Annual Rainfall.
Toronto . . .	43° 39′ N.	79° 23′ W.	341	22·5° F.	67·6° F.	33·0 in.
Detroit(U.S.A.)	42° 20′ N.	83° 3′ W.	745	24·3° F.	72·1° F.	32·3 ,,

These figures show the climate of the Ontario Lake Peninsula, which is in the latitude of Northern Italy. The winters are cold, the summers are hot, and the rainfall is sufficient for the growth of the vine and other fruits of warm lands.

1221. The Forests of Canada. These are (i) the sub-arctic forest, which stretches across the continent south of the Barren Ground; (ii) the eastern forest; and (iii) the forests of the western mountains. The northern forest stretches from Southern Alaska across the north of Alberta, Saskatchewan, Manitoba, Ontario, and Quebec into Labrador. Small evergreen conifers are mixed with birch or poplar. The forest is intersected by lakes and rivers and by swamps and marshes which the Indians call muskegs, and the largest trees grow in the well-drained valleys. The lumber, or cut timber, which is not very durable and too far from markets to be valuable, is best suited for making wood-pulp and paper. The eastern forest covers Eastern Canada, Newfoundland, Prince Edward Island, Cape Breton Island, Nova Scotia, and the Eastern United States, and produces four-fifths of the lumber cut in Canada. The common trees in the north are white and red pine, spruce, cedar, balsam, fir, and larch. On the coast of Nova Scotia and in the United States the trees lose their leaves in winter. The gigantic Douglas fir is the most valuable tree of the western forests, in which deciduous trees are not found.

1222. The Maritime Provinces. (i) Prince Edward Island. Prince Edward Island (2,185 square miles) is a low island with a fiord coast, about as large as Devonshire, and resembles it in its climate, which is moist and equable, its soil, which is weathered red sandstone, and its occupations, which are fishing along the indented coast, and fruit-growing and dairy farming elsewhere. Cheese and butter are made for export in co-operative dairies, and pigs are fattened for bacon on the skim milk. There are many plum, cherry, and apple orchards. The capital is Charlottetown.

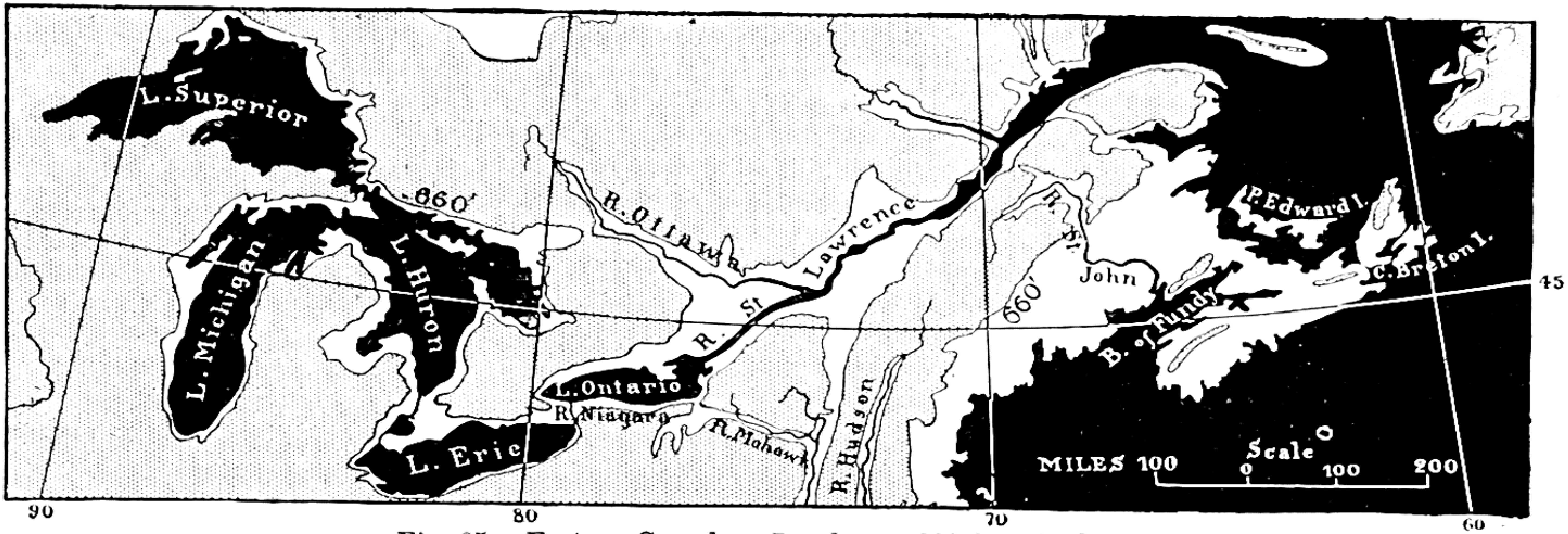


Fig. 85. Eastern Canada. Land over 660 feet shaded.

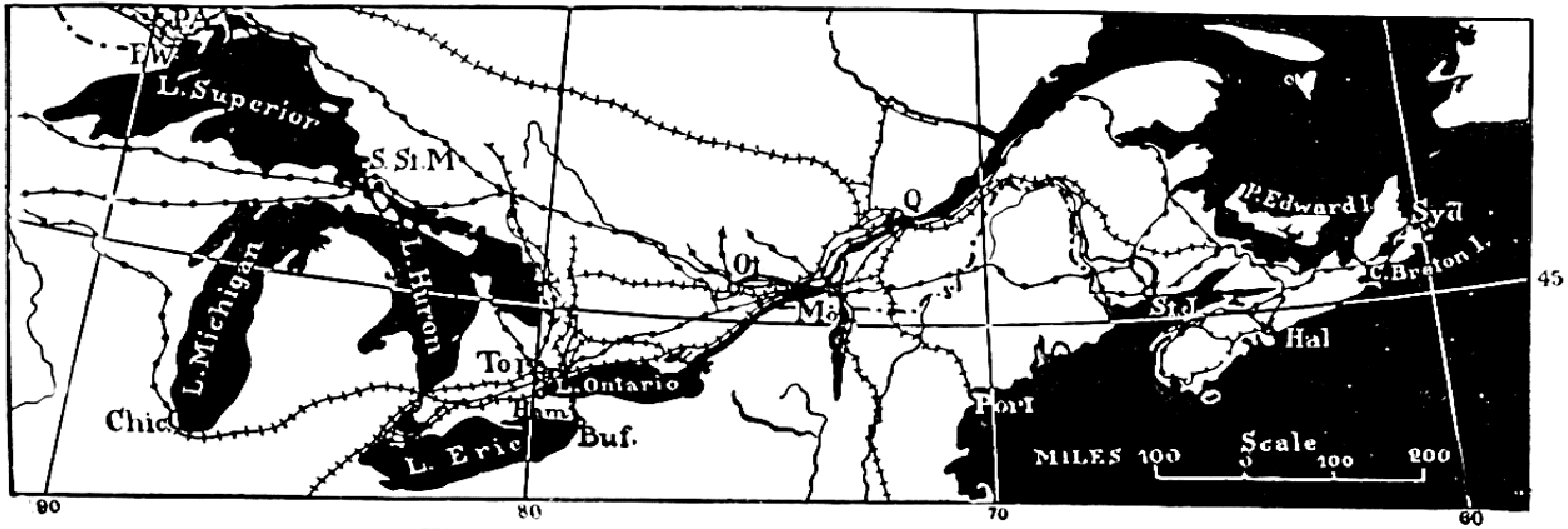


Fig. 86. Routes and Towns of Eastern Canada.

1223. (ii) Nova Scotia. Nova Scotia (21,000 square miles), half the size of Newfoundland, includes (i) the irregular peninsula of Nova Scotia on the mainland, separated by the long narrow Fundy Bay from the coast of New Brunswick; and (ii) Cape Breton Island, which is separated from the mainland by the narrow drowned valley known as the Gut of Canso, and deeply cut by the Bras d'Or, an arm of the Atlantic. The sinking of the coast has given Nova Scotia many fine harbours, the best of which are Halifax on the mainland and Sydney on Cape Breton Island. The climate is equable, but fogs are frequent on the east coast, which is exposed to the Atlantic. The west coast is more sheltered, and contains the richest orchard and farming land. Apples are grown for export in the Annapolis valley, where Annapolis is the oldest town on the continent north of Florida. Dairy-farming is extending as the forests are cleared; lumbering and the wood-pulp industry are important; coal-mining is equally so; but fishing is the chief occupation.

1223 a. The Atlantic tides are forced up the narrow Bay of Fundy, and rise to a great height. They deposit fertile mud at the mouth of the rivers, where the best farming land is found.

1224. Nova Scotia has a great commercial and industrial future. Coal is abundant not only round Sydney, but also at Pictou and New Glasgow on the north coast of the mainland, where iron ore from Newfoundland and local ores are smelted. In 1910 Nova Scotia produced half of all the coal raised in Canada. Sydney smelts and casts Newfoundland iron ore into steel rails for the Canadian Pacific Railway, and provides it with sleepers cut and tarred in the adjacent pine forests. Halifax, on a magnificent ice-free harbour, less than 2,000 miles from Ireland, a terminus of the Canadian Pacific line, is a growing port, and a naval base of great value to the British Empire.

1225. (iii) **New Brunswick.** New Brunswick (28,000 square miles), on the mainland, is nearly as large as Scotland, and in the latitude of France. It has a fiord coast with good harbours, and those along the Bay of Fundy are always ice-free. The fisheries are very important, but shipbuilding, once a great industry, has declined since wooden ships were disused. Much of the province is covered with forests of spruce, from which wood-pulp is made. Agriculture and dairy-farming are growing as settlement and clearing progress. The chief port is St. John, at the mouth of the St. John River; and the capital is Fredericton, at the head of tidal water, 90 miles up the same river.

1225 a. The St. John River (450 miles) rises in the United States and flows to Fundy Bay through a narrow gorge. It falls over a ledge of rock near its mouth, and forms a fall towards the sea at low tide, and a fall in the opposite direction at high tide. At half tide there is no fall, and ships can pass inland four times a day. The country below the fall and gorge is low, and but for this curious formation the high tides of Fundy Bay would flood some of the richest land in New Brunswick. Above the fall the river is navigable for 200 miles.

1226. The Laurentian Provinces. These are (i) Quebec (342,000 square miles), and (ii) Ontario (320,000 square miles), separated by the Ottawa tributary of the St. Lawrence. The frontier between Quebec and Labrador, in uninhabited country, is not yet determined. The Laurentian Provinces, from which modern Canada has grown, face the Old World, and possess a magnificent system of natural waterways, extending from the open Atlantic by the St. Lawrence estuary and valley and the chain of Great Lakes into the heart of North America. Many other good natural routes open to the river, and make communication easy. The climate, though cold in winter, is bracing; the natural resources of the forests, lakes, seas, and mines are very great; and there is much fertile farming land. Raw materials from all parts of the world can be cheaply brought by water into the interior, and the rivers supply inexpensive power for manufacturing them. Canada is thus fitted to support a large population and do a great home and foreign trade.

1227. (i) **Quebec.** Quebec is twice as large as France, from which it was settled. The majority of the inhabitants are of French descent and still speak French. It has a short coast-line on Hudson Bay and a long one on both banks of the St. Lawrence. Quebec is divided into three natural regions: (i) the bleak infertile Laurentian Plateau, north of the St. Lawrence, covered with glacial lakes and coniferous forests, and falling steeply on the south to (ii) the St. Lawrence Valley, the most fertile part of Quebec, containing 10,000 square miles of good land and most of the towns and people; and (iii) the Appalachian region, south of the St. Lawrence, which is between 3,000 and 4,000 feet high in the rugged Gaspé Peninsula. This is being cleared, but is still little known. Its height makes it liable to early frosts, and the best land lies round Chaleur Bay to the south. Along the St. Lawrence coast below Quebec there are few settlements except fishing villages.

1228. The St. Lawrence Valley. The high edges of the Laurentian Plateau and the Appalachian Highlands rise above the valley on both sides and make the entrance into Canada by sea very impressive. Spurs approach the river at Quebec ('The Narrows'), where the estuary ends, though the tide runs up the river for another 90 miles. Above Quebec the valley widens and extends to Lake Ontario, and except where it is crossed by low heights of igneous rock it is nowhere over 300 feet. The floor is deeply covered with boulder clay and with more recent sediments brought down by the innumerable rivers, which drain morainic lakes, and form falls as they descend from the highlands. These supply cheap water power, and a line of manufacturing towns will grow up along this 'fall line', which is nearly 1, 000 miles long. Minerals are less abundant than in Ontario, but nearly all the world's supply of asbestos is found south of the St. Lawrence.

1229. The French discoverers found maize growing on the site of what is now Montreal, and much wheat was grown in the early half of last century. Wheat can now be grown more cheaply in the prairies, and the farming land of Quebec is used for mixed farming,. dairy-farming, fruit-growing, &c. Excellent cheese is made in summer, and butter in winter.

1230. The climate has already been described (§1220). The winters are cold and snowy, but sledges afford an easy mode of travel over the hard level snow. The summers are warm enough to ripen many crops, including tobacco and maize. The sugar maple yields maple sugar, which is refined in the larger towns.

1231. The chief towns are Quebec and Montreal, on the St. Lawrence; Hull on the left bank of the Ottawa River, opposite Ottawa, a lumbering centre, manufacturing matches, pulp and paper; and a number of industrial towns, among which Sherbrooke, in a mining district, specializes in electrical work and machinery.

1232. Quebec is finely built on heights above the St. Lawrence, where the great river narrows at its exit from the central valley. It was founded as a fur-trading post because it was a good route centre, and easy of defence, and from its site it has often been called the Gibraltar of the New World. The Old Town, on the heights, with its many churches and narrow picturesque streets, recalls Old France rather than modern North America. The modern business quarter is built at the base of the cliffs at the waterside. Quebec was originally a great port, but the deepening of the river has led to the growth of Montreal at its expense. Many industries are carried on in and near the city. These include tanning with the bark of the spruce or hemlock, the making of leather into boots and shoes, and the cotton manufacture with electric power generated by Montmorenci Falls (§ 1131).

1233. Montreal, 180 miles above Quebec, and over 1,000 miles from the Atlantic, would be the greatest city of North America if it were ice-free in winter. Routes by land and water, and from north, south, east, and west meet there, and make Montreal the metropolis of Canada. The river has been deepened to admit the largest ocean steamers, and the Great Lakes bring the wheat of the western prairies to its wharves. It is the chief terminus of the Canadian Pacific Railway. The Ottawa River, which encircles the islands on which the city is built, opens up the richest lumber district in the world. A few miles below Montreal the Richelieu, from Lake Champlain, the only important tributary from the south, makes an easy natural route to the Hudson Valley and New York, which is 420 miles from Montreal or a little farther than Edinburgh from London. The divide between the Richelieu and the Hudson is only 120 feet high, and 20 miles wide, and the Richelieu-Champlain-Hudson furrow is one of the most important natural features of the Appalachian region. Montreal is also in the middle of a broad fertile valley, with a growing population, and the Lachine rapids supply it with cheap electric power. Such a combination of advantages explains why it now has a population of half a million people. The grain of the West is used in numerous flour-mills, distilleries, and breweries; hides and tallow are made into boots, leather goods, candles, and soap; the Hudson Valley railways bring in raw cotton, sugar, and tobacco from the United States; the forests of Quebec feed the timber and pulp mills; and ores are cheaply carried from the mining districts and wrought into locomotives, machinery, and hardware of all kinds.

1233a. The St. Lawrence is open from April to the middle of December, and Belle Isle Strait from July to December. Both are often full of ice in the early season, but there are lanes of open water.

1233b. Anticosti (2,600 square miles) is a low island covered with forests of dwarf spruce.

1234. (ii) Ontario. Ontario consists of (i) the Laurentian Plateau, and (ii) the St. Lawrence Valley, which is widest in the Lake Peninsula between Lakes Ontario, Erie, and Huron. The Laurentian Plateau is an undulating region, seldom over 1,200 feet high, which forms the high shores of Lakes Huron and Superior, but recedes from Lakes Erie and Ontario, which have flat shores. The divides between the rivers are low, and the whole plateau is covered with morainic lakes. The largest are Nipigon (1,450 square miles), drained to Lake Superior, and the Lake of the Woods, on the frontier with the United States, drained to Lake Winnipeg. About one-fifth of the surface of Ontario is water. The rivers have a sufficient fall as they descend from the plateau to supply water and electric power. Northern Ontario is a forest region, and very thinly settled. Much lumber is floated down the Ottawa river to Ottawa, at the foot of the Chaudière Falls (40 feet), which supply power to the saw-mills, pulp, paper, and other factories. The most thickly peopled part of Ontario is the Lake Peninsula, in the latitude of Northern Italy, which has hot enough summers for the vine, peach, nectarine, apricot, and melon to ripen out of doors. During the season special fruit trains run daily to Toronto, Montreal, and other cities, and wine is made. Wheat was once very important, but can now be grown more cheaply in the West, though the towns of Ontario mill it into flour and make it into breakfast foods, biscuits, &c. Dairy-farming is very important, and bacon, fattened on Ontario maize, cheese, and butter are exported.

1235. Ontario is rapidly replacing the United States as the market of the Canadian prairies, to which it supplies agricultural machinery and other manufactured goods. Water power is abundant, and electric power is largely used instead of steam, as no coal is found. The Laurentian Plateau yields silver, very pure iron, copper, petroleum, and other minerals. Sudbury, north of Lake Huron, has the richest nickel and cobalt mines in the world. Metal industries are growing at Hamilton on Lake Ontario, and elsewhere.

1236. Toronto (375,000 people), the second city in Canada, on a beautiful bay of Lake Ontario, is a centre of railway and steamer routes, and has a very large commerce. Cheap electric power is supplied from Niagara Falls, and many industries work up raw material from all parts of Canada. Ottawa, the Dominion capital (86,000), the third city of Eastern Canada, is built at the confluence of the Ottawa and Rideau Rivers, 100 miles from Montreal. The Houses of Parliament, on high ground, command a fine view of the Chaudière Falls, to which the city owes its situation. Ottawa is connected by the Rideau Canal with Kingston, at the eastern end of Lake Ontario, which has flour-mills, and shipbuilding yards, and leather, iron, and tobacco manufactures. Farming machinery is made in

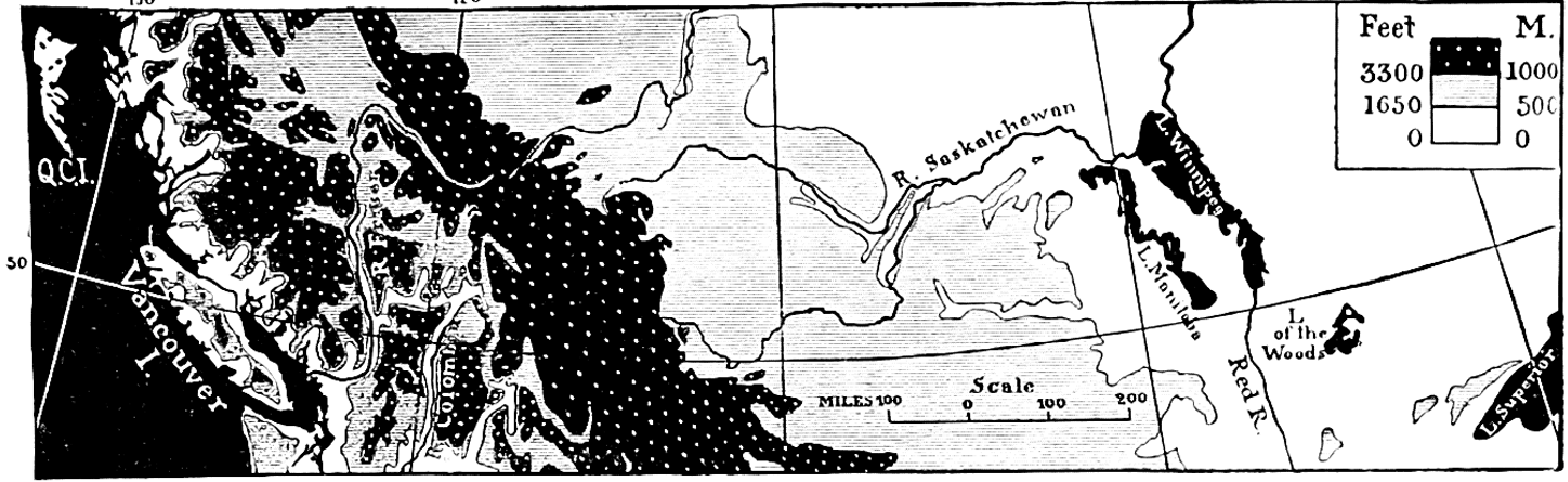


Fig. 87. Physical Features of Western Canada.

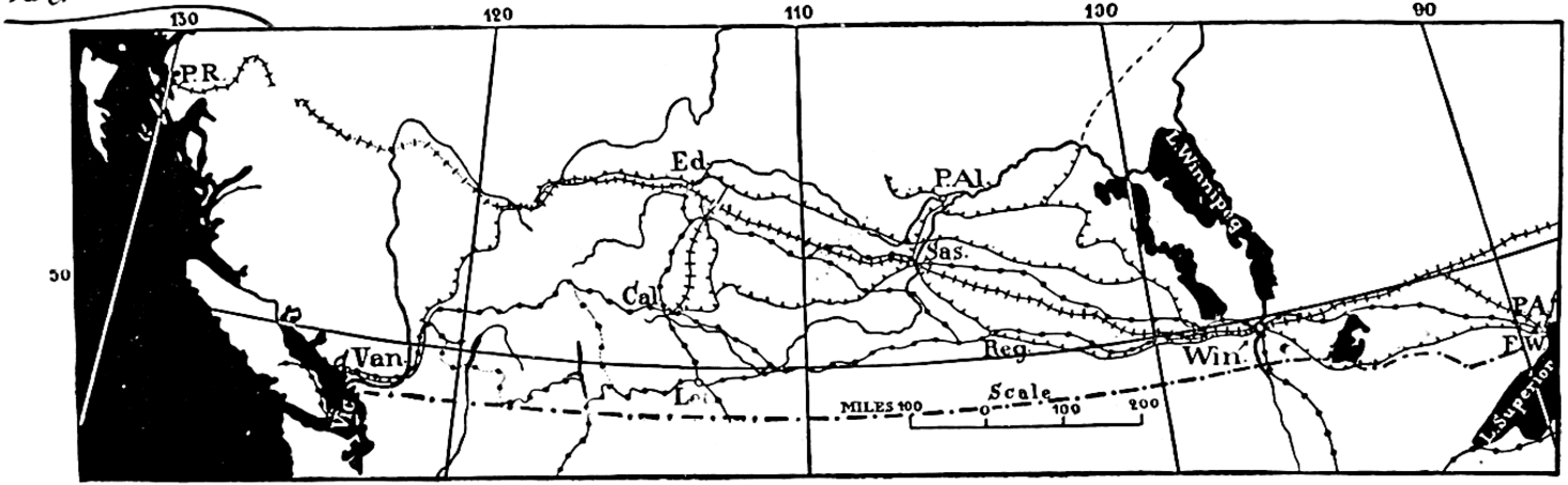


Fig. 88. Routes and Towns of Western Canada.

all the larger towns, and shipbuilding is important at all the Lake ports. Fort William and Port Arthur, near the western end of Lake Superior, where the railway routes across the prairies reach the St. Lawrence, have grown rapidly with the opening up of the West. They are only 400 miles from Winnipeg, the capital of the prairies, and the third city of Canada, but 1,000 miles from Montreal. An enormous commerce passes yearly between east and west by the St. Lawrence and the Great Lakes, and the tonnage of the Soo Canal, which is closed in winter, exceeds that of the Suez Canal.

1237. The Prairie Provinces. The wheat lands of Canada have moved rapidly west since the Canadian Pacific Railway (C. P. R.) was opened in 1886 from Montreal to Vancouver. The region between the Great Lakes and the Rockies, divided into Manitoba, Saskatchewan, and Alberta, each about 250,000 square miles, forms Canada's Thousand-Mile Farm, and most of the suitable land within reach of a railway is now planted with wheat.

1238. (i) Manitoba. Manitoba, the most eastern and therefore the most thickly settled prairie province, is in the heart of North America, equidistant from its four oceans, in the basin of the Saskatchewan ('rushing water') from the Rockies, which flows into Lake Winnipeg. The waters of Lakes Winnipeg and Winnipegosis are drained by the Nelson to Hudson Bay. The Churchill, also flowing to Hudson Bay, drains a region added to Manitoba in 1911.

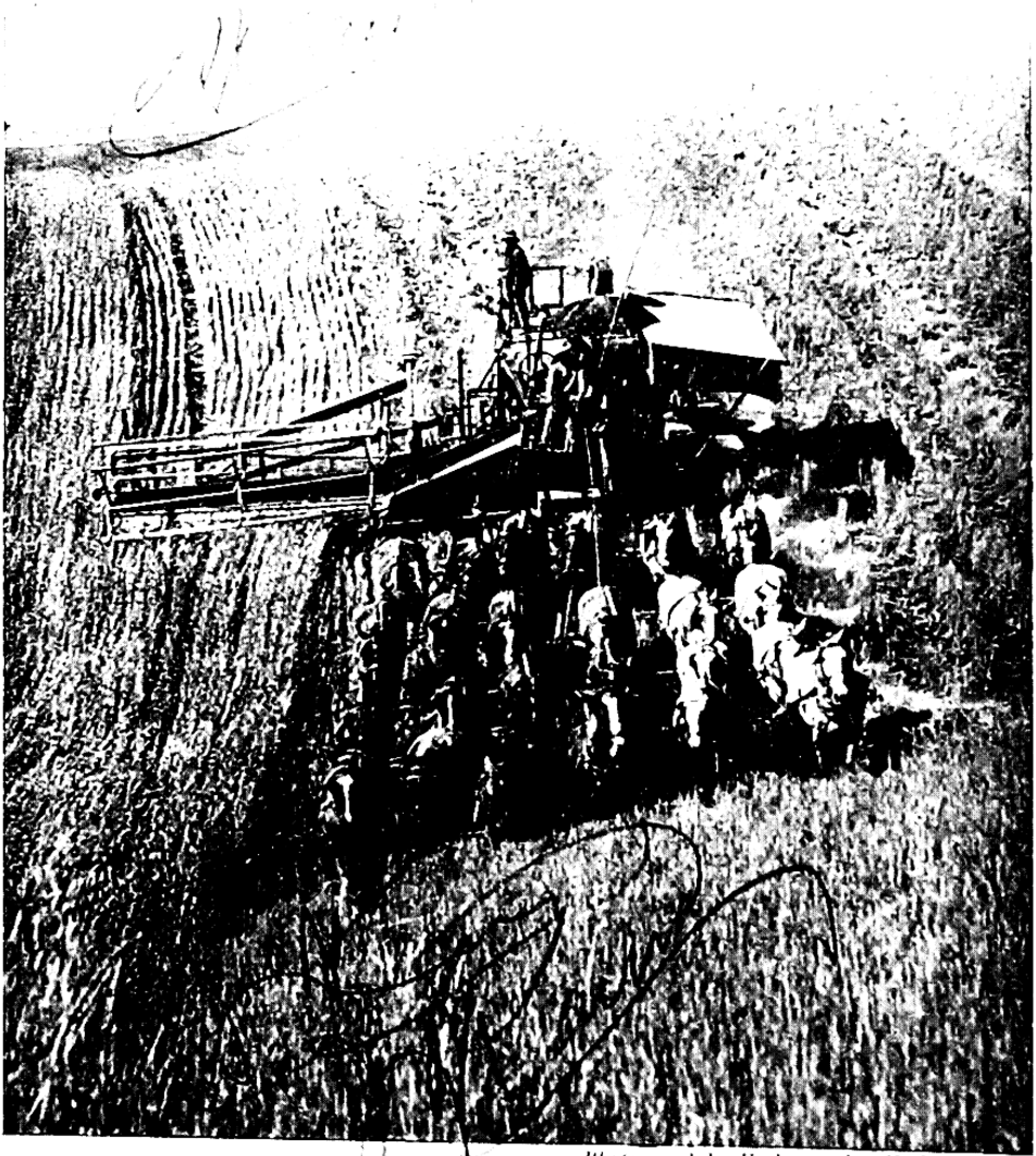
1239. Lakes Winnipeg, Winnipegosis, and others in Northern Manitoba are the remnants of the immense glacial Lake Agassiz (110,000 square miles) which once covered most of the province and extended into the

United States. The southern part was gradually filled by sediment brought down by the many rivers which flowed to it and by its own vegetation. It now forms the broad valley across which the Red River flows north to Lake Winnipeg. This valley, which is over 50 miles wide where it enters Manitoba, is covered with a deep fine soil, containing hardly a stone. Elsewhere great deposits of boulder clay have smoothed away all the irregularities of the prairie, which stretches away in all directions as a vast level plain. East of Lake Winnipeg the old shore-line of Lake Agassiz, nowhere over 500 feet high, forms the edge of the second prairie, 1,600 feet above the sea.

1240. (ii) Saskatchewan rises in the west by the low Missouri Coteau, the divide between the Gulf of Mexico and Hudson Bay drainage, to the third prairie, which reaches about 3,000 feet at the base of the Rockies. Athabasca is the largest of its many glacial lakes, and it is intersected by a network of rivers, drained either to the Saskatchewan or the Mackenzie. The north is covered with sub-arctic forest (§ 1221), and is a fur-trapping region, with a small Indian population. Settlement is rapidly pushing north as railways are built.

1241. (iii) Alberta includes the eastern slopes of the Rockies, and is higher and drier than Saskatchewan. Until a few years ago it was a grazing country, where cattle were kept on great runs or ranches, but much is now becoming wheat land.

1242. The Wheat Lands. The prairies are well suited for wheat, which can be grown wherever the summers are warm enough and not too dry. The cold winters prevent autumn sowings, but hard spring wheats do well. The level treeless prairies need no clearing, and machinery can be used to economize labour, which



Photograph by Underwood & Underwood.

Fig. 89. Reaping in the Prairie Wheatfields.

An example of modern American farming machinery. This harvester cuts and threshes at the same time. The team of horses is often much larger, and steam and motor machines are also used.

is scarce. The soil is fertile, and holds heat and moisture; the spring thaws supply water to the germinating seed; the light summer rains fill the ear; and the dry summers allow it to ripen and be harvested in perfect condition. Sowing begins as soon as the soil is thawed 6 inches and goes on till the end of April. The heat increases rapidly through May and June, and the days' lengthen, for the Sun is moving north. They are longest in high latitudes, and good wheat is grown in the Peace River Valley (lat. 58° N.), where the days are 18 hours long at Midsummer. The long hot days of continuous sunshine shorten the period of growth, and allow wheat to ripen even where the spring is very late. Southern Alberta, where chinook winds make the winters mild, grows winter wheat, most of which is exported to Japan.

1242a. Long cultivation and experiment have produced an immense variety of wheats, suited to different soils and climates. Accident sometimes leads to the discovery of a suitable one, and Red Fife, the most widely grown Canadian wheat, was introduced through a single grain which occurred in a consignment of seed wheat sent to a Canadian farmer from Danzig in 1842.

1243. The Ranching Country. Western Alberta is too dry for wheat, and much is still grazing land. Cattle can be kept out of doors through the winter, for the chinook winds prevent snow from lying, and stock can find pasture. The grasses do not rot on the ground as in wetter regions, but are dried by the hot summer sun into standing hay. Stock can scratch away the light snow which covers it and a spell of the chinook exposes it in perfect condition. In former days the bison migrated north every winter to Alberta to these pastures.

1244. The prairies are treeless, and very cold in winter, and settlement would have been slower but for the abundance of brown coal. Black coal and anthracite are widely found in the Rockies, and the output of the Lethbridge mines is sent as far west as Winnipeg.

1245. Prairie Towns. Winnipeg, the third city of Canada (135,000), was a small fur-trading post at the junction of the Assiniboine and Red Rivers in 1871. Its position marked it out for a great future, for Lake Winnipeg stretches north for nearly 300 miles, and all routes between east and west must pass south of it through Winnipeg. Winnipeg, half-way between Montreal and Vancouver, and only 400 miles from Lake Superior, is the natural link between east and west, and the centre of exchange for the products of both. It is the largest grain and fur market in the Empire, the largest railway centre in Canada, and is rapidly becoming a great manufacturing city. The demand for farming machinery and for rails and trucks to carry the ever-growing harvest east have created great railway and machine shops. Winnipeg is also becoming a great meat market for beef raised in the ranching west, and for bacon and beef from animals fed on grain which is poor in quality or colour.

1246. West of Winnipeg are Brandon and Portage le Prairie, both engaged in the wheat trade and manufactures; Regina (30,000), the capital of Saskatchewan, a very small town in 1901; and Calgary, the capital of Alberta at the base of the Rockies (45,000), in a dry region which is now irrigated from the Bow River, a feeder of the Saskatchewan. Edmonton, 200 miles north of Calgary, is a growing city in the newly settled wheat lands of Northern Alberta.

1246a. Edmonton is connected with Winnipeg by rail, and in the 800 miles between them there are nearly 100 townships.

1247. Transcontinental Railways. The routes of Canada are shown in Figs. 86, 88. Winnipeg is a junction on three main lines. The C. P. R. runs from the ports of Halifax, St. John, Quebec, and Montreal, by the Great Lakes and Port Arthur to Winnipeg, and through Regina to Medicine Hat, where the line forks.

The main line goes by Calgary and the Kicking-Horse Pass to the Columbia Valley, crosses the Selkirk and Gold Ranges, and reaches the Pacific by the Fraser canyon. Its Pacific terminus is Vancouver, on Burrard Inlet, 2,900 miles from Montreal. The southern branch goes by the Lethbridge coalfield and the Crow's-Nest Pass to the mining districts of the Kootenay Valley and Vancouver. The Grand Trunk Pacific is being built from Moncton and Quebec, where a great bridge will carry it across the St. Laurence, through the clay belt of Northern Quebec north of the Lakes to Winnipeg, from which it is continued by Edmonton (2,200 feet) and the Yellowhead Pass (3,700 feet) to Prince Rupert, on a fine fiord 550 miles north of Vancouver. The distance from Moncton to Prince Rupert will be 3,780 miles, but the gradients are much easier than on the shorter C.P.R. The Canadian Northern combines both routes, reaching Vancouver from Winnipeg through Edmonton, the Yellowhead Pass, and the Fraser Valley. The season between the wheat harvest and the closing of the Great Lakes to navigation is short, and wheat which is delayed in reaching the lake ports must be stored in 'elevators', or sent at greater expense overland. To facilitate export a new line is projected to a port on Hudson Bay, which is ice-free in the harvest season. This is much the shortest route between the Canadian Prairies and the British Isles, but is closed most of the year.

1247a. Regina is 1,800 miles from Montreal, or about as far as Paris from Constantinople. Calgary is 2,250 miles from Montreal, or about as far as Inverness from Constantinople.

1248. The Pacific Provinces. (i) **British Columbia** (355,000 square miles). British Columbia extends from the latitude of St. Petersburg to that of Paris (700 miles), and from the crest of the Rockies to the Pacific. The mountain belt is 600 miles across in the south. The Rocky

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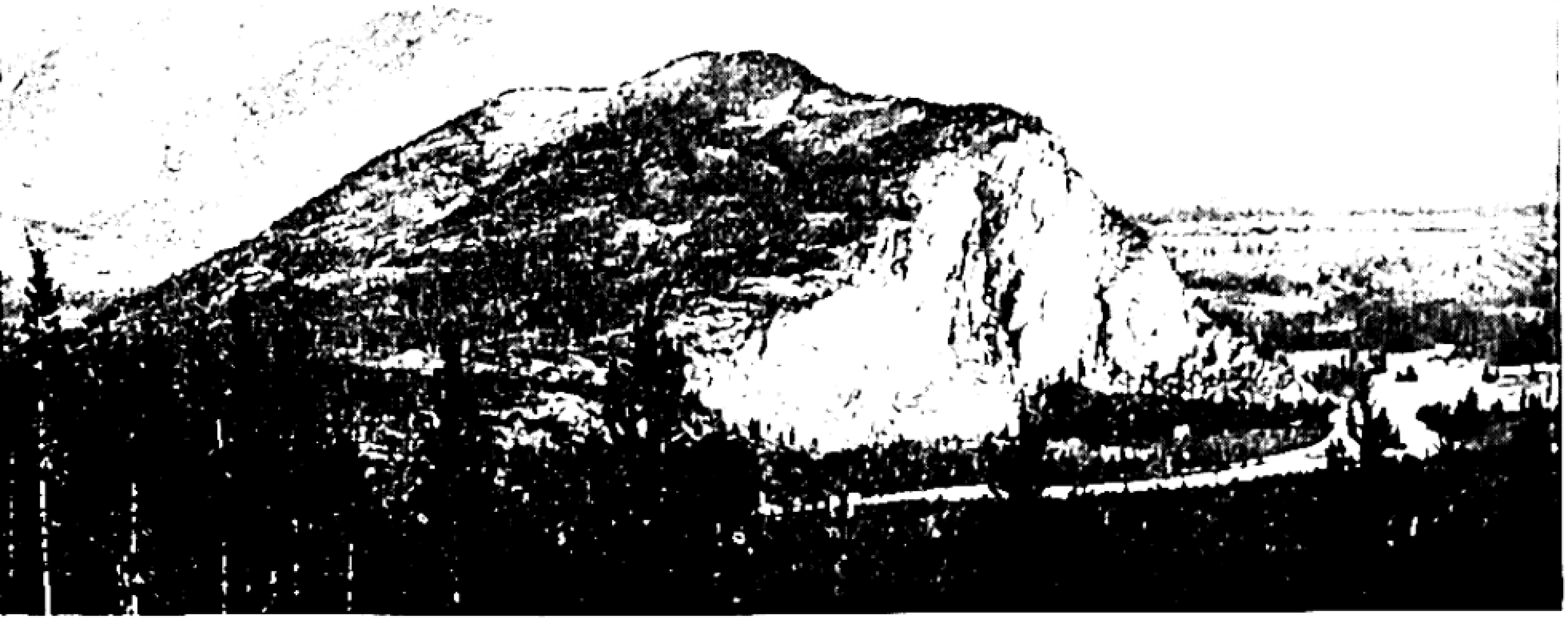

Fig. 90. Peaks and Valleys in the Canadian Rockies.

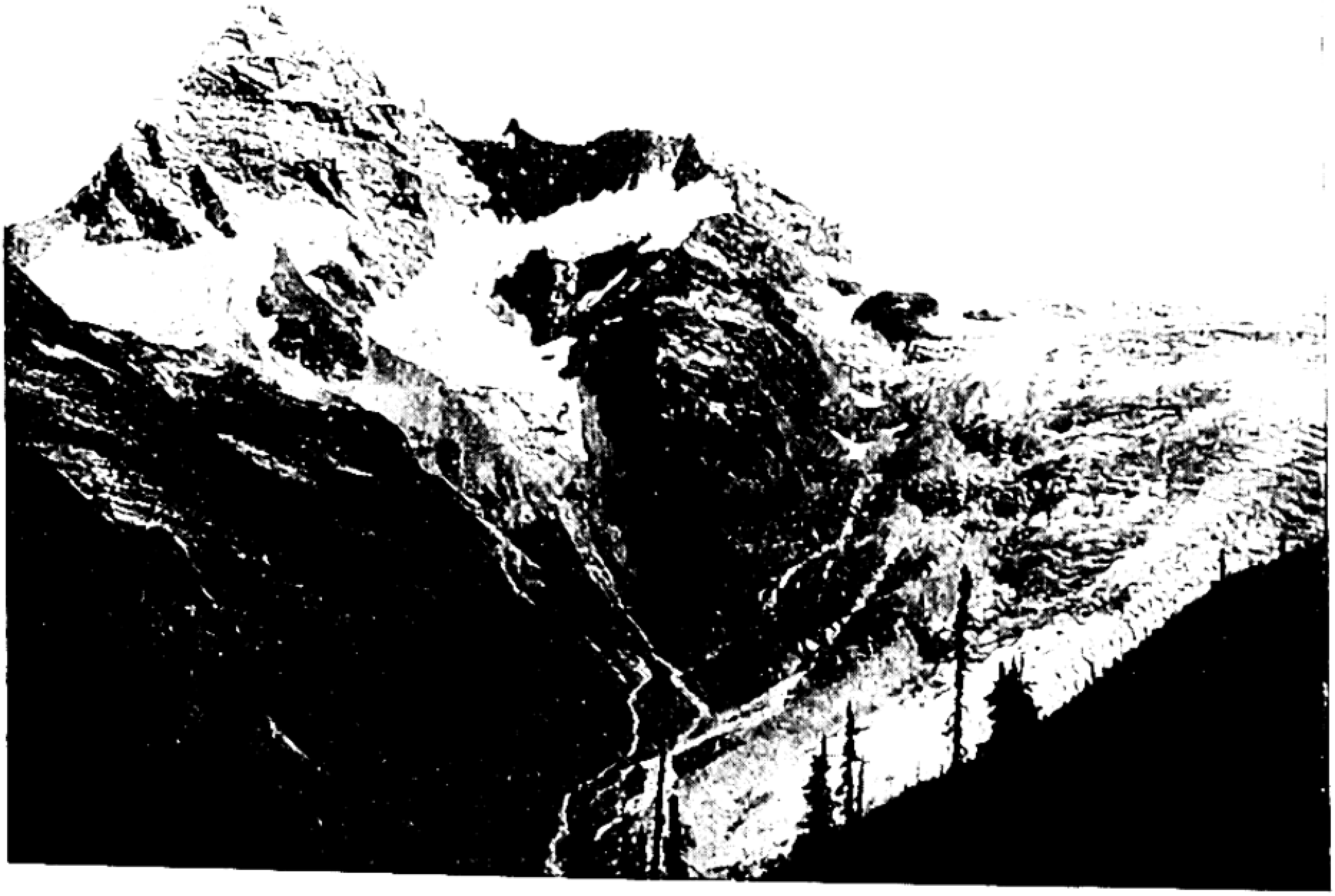

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Fig. 91. Mt. Sir Donald (Selkirk Range).

Sir Donald, named after Lord Strathcona, the father of modern Canada, is 10,650 feet high. It is well seen from the Canadian Pacific main line. Notice the great glacier to the right of it.

Mountains rise steeply above the high plains of Alberta, and are high enough to have fine glaciers and snow peaks. There are no low passes, and the Kicking Horse, by which the main line of the C. P. R. climbs to the plateau beyond the Rockies, is over 5,300 feet high.

1249. The plateau of British Columbia, between the Rockies on the east and the Northern Cascades on the west, is a rugged region crossed by the Gold, Selkirk, and other mountain ranges. The north is drained by the Peace and Liard Rivers to the Mackenzie and the Arctic Ocean, but most of the plateau is drained to the Pacific by the Stikeen, Skeena, Fraser, Columbia and its tributary the Kootenay, and other rivers. The courses of the Fraser, Columbia, and Kootenay, in alternate longitudinal and transverse valleys, have already been described (§ 1159). The Columbia reaches the sea in United States' territory, and the Fraser is the best natural gateway into Canada from the Pacific. The coast has sunk, forming long fiords with good natural harbours. A coastal range, west of the Cascades, has been entirely cut off from the mainland by the sinking of the land. The drowned longitudinal valleys form sounds between the mainland and the islands, which are the higher parts of the drowned range. The largest of these are Queen Charlotte's Island in the north, and Vancouver Island in the south, at the entrance to a network of drowned valleys which form Burrard's Inlet, Puget Sound, and other fiords.

1250. Some of the rivers widen into lakes. The rivers which cross the glaciated Central Plains gather up the waters of many irregular morainic lakes, while those which flow to the Pacific widen into long narrow valley lakes, like those of the Swiss or New Zealand Alps, or of the Scottish Highlands. The most beautiful are the Arrow Lakes, drained by the Columbia.

1251. The climate has already been described. The high western slopes are exposed to the westerly winds, and have rain at all seasons. At sea-level the climate is equable, especially in Vancouver Island. The lee slopes of all the ranges are drier than the windward, and some of the inner valleys have to be irrigated. The temperature varies with the elevation. The windward slopes are densely forested (§ 1220) and supply the finest timber in the world, but the eastern ranges are barer. Lumbering is exceedingly important. The best agricultural land is east of the Cascades, where both fruit and wheat are grown. The drier valleys are used for raising stock and dairy-farming.

1252. The discovery of gold first attracted immigrants, but settlement only became important with the building of railways. Gold is widely distributed, but is most worked in the Kootenay district. Coal is abundant near the Crow's-Nest Pass in the same region, and is used to smelt Kootenay ores at Rossland, the chief centre. A rich field of almost smokeless coal at Nanaimo, on Vancouver Island, supplies the navy in Pacific waters and the coast cities.

1253. British Columbia resembles Norway in physical features, climate, natural resources, and occupations, but has the advantage of being in lower latitudes. Both countries have good harbours along their fiord coast, and these are kept ice-free in winter by warm currents. Rivers rising high among the mountains supply power for transporting and working lumber, and for the growth of other industries. The hinderland of British Columbia, with its rich agricultural valleys, is better than that of Norway. The chief occupations are mining in the mountains, agriculture in the more fertile valleys, lumbering in the forests, and fishing along the coasts.

Cod and halibut are the chief sea fisheries of British Columbia, and the rivers, like those of Norway, swarm with salmon. The largest canneries are at New Westminster, near the mouth of the Fraser.

1254. Vancouver, the terminus of the C. P. R., on Burrard's Inlet, is the fourth city of Canada (100,000). In 1886 the site was covered with virgin forest, and giant Douglas firs remain in the city park. It was chosen as the terminus of the C. P. R. because it was the best harbour on the shortest route from Montreal, but the gradients between Calgary and the Lower Fraser are very steep. Vancouver exports wheat from Alberta, canned salmon from the rivers, minerals and lumber from the mountains, and fruit from the valleys of British Columbia. Its fine harbour is almost opposite Nanaimo, and coal is cheap and abundant. Steamers run regularly to the Pacific ports of the United States, China, Japan, and Australia.

1255. Prince Rupert, the terminus of the Grand Trunk Pacific, on the shortest route from Liverpool to Japan, will be a great port when Northern Canada is settled.

1256. Vancouver Island is cut off from the mainland by straits which are less than a mile wide at their narrowest. It is 285 miles long and from 60 to 80 miles wide. It has fine mountain and lake scenery, rich forests and coalfields, fertile valleys and good harbours. Victoria, at the southern end, is the capital of British Columbia, and Esquimalt, the naval station, is connected by rail with the Nanaimo coalfield, 80 miles to the north.

1257. (ii) **Yukon.** Yukon (206,000 square miles) is drained by the Lewis and the Pelly to the Yukon. The St. Elias Alps contain some of the highest peaks in North America, and all the routes across them are difficult. The fiord coast is included in Alaska, which belongs to the United States. Lying north of 60° N.

Yukon has a severe climate, and is a tundra region, and would be of no value but for the gold which is found in every valley. The Klondyke, the richest goldfield, is reached by a railway which runs from Skagway, on the fiord of Lynn's Canal, across the difficult White Pass, or by the Yukon River from Bering Sea (1,350 miles) when it is ice-free. Dawson City is the chief town.

1258. The North-west Territories are a tundra region, covered with morainic lakes, and with thin forest in the south. They extend east to Hudson Bay, and are known as the Barren Grounds. A small population, chiefly Indian, collects furs, hunts caribou, and fishes in the rivers and lakes. There are no towns, but the Hudson Bay Company has trading posts.

1258a. Alaska is a mountainous region, drained by the Yukon. It is rich in gold, but poor in all else. The country is thinly peopled by Indians and Eskimo, who live by the halibut, seal, and other coastal fisheries. In recent years its fine scenery has attracted tourists during the short summer.

1258b. The Bermudas, a group of coral reefs and islands, are important as a naval station, half-way between Newfoundland and the West Indies. The soil is not fertile, but the climate is mild and early vegetables are largely grown.

Exercises

1. Compare and contrast (*a*) Newfoundland and Norway, and (*b*) Nova Scotia and Scotland. Explain fully the resemblances and differences.
2. How has geographical position affected the growth of the following cities: Montreal, Ottawa, Quebec, Sydney, Vancouver, Winnipeg?
3. Explain fully all the different geographical conditions which favour wheat-growing in the Canadian prairies.
4. Compare the advantages and disadvantages of the principal trans-continental railway routes across Canada.
5. Describe fully the natural resources and occupations of British Columbia. With what other parts of Canada would you compare it? Why?

CHAPTER VII

THE UNITED STATES

1259. Size and Population. The United States extend southwards from the Canadian to the Mexican frontier, and from the Atlantic to the Pacific. They are smaller than Canada (3,000,000 square miles), but contain thirteen times as many people (92,000,000). Of these in 1910 over 13,000,000, or one-seventh, were of foreign birth, and more than another tenth, nearly 10,000,000, were of negro descent. A century ago, in 1810, the United States had the same population as Canada had in 1911.

1260. The distribution of this population is instructive. Over 5,250,000 persons live in Greater New York, including Jersey City. Chicago comes next with nearly 2,200,000 people, and Philadelphia third, with 1,600,000. St. Louis, Boston, Cleveland on Lake Erie, Baltimore, and Pittsburg follow with over 500,000, and Detroit, Buffalo, and San Francisco have over 400,000. The ten largest cities are east of the Missouri, and eight of them are on the Atlantic coasts or round the Great Lakes. Forty other cities have 100,000 people or more, and only six are west of the Mississippi.

1261. Physical Features. The physical features of Canada are continued south into the United States forming (i) the Appalachian Highlands and its coastal plains, (ii) the Central Plains or Prairies, and (iii) the Western Cordillera. These have been described in Chapters I—III.

1262. Climate. The following figures give the mean temperature of the coldest and warmest months and the mean annual rainfall in different regions.

Place.	Latitude.	Longitude.	Height in feet.	Coldest Month.	Hottest Month.	Mean Annual Rainfall.
Boston . .	42° 21′ N.	71° 4′ W.	131	27·0° F.	71·2° F.	43·8 in.
New York .	40° 43′ N.	74° 11′ W.	135	30·2° F.	73·6° F.	43·4 ,,
Baltimore .	39° 18′ N.	76° 37′ W.	170	33·4° F.	77·4° F.	43·3 ,,
Norfolk (Va.)	36° 51′ N.	76° 17′ W.	115	40·5° F.	78·8° F.	50·1 in.
Charleston .	32° 47′ N.	79° 56′ W.	23	49·3° F.	81·3° F.	53·5 ,,
New Orleans	29° 58′ N.	90° 4′ W.	121	53·0° F.	81·3° F.	57·5 in.

These show the climate of the Atlantic and Gulf coastal plain. Chesapeake Bay may be taken as the dividing line between the two climatic regions. The north has cold winters, hot summers, and a rainfall of about 40 inches. The south has warm winters as well as hot summers and a heavier rainfall. New Orleans, on the Gulf coastal plain, has a rather warmer winter and a little more rain.

Place.	Latitude.	Longitude.	Height in feet.	Coldest Month.	Hottest Month.	Mean Annual Rainfall.
Detroit .	42° 20′ N.	80° 3′ W.	745	24·3° F.	72·1° F.	32·3 in.
Cleveland	41° 30′ N.	81° 42′ W.	840	26·1° F.	72·5° F.	35·4 ,,
Chicago .	41° 53′ N.	87° 37′ W.	837	23·7° F.	72·3° F.	33·5 ,,

This table shows the climate of the densely populated region round the Great Lakes. The winters are colder and the rainfall is less than on the coastal plain, but the summer temperatures are the same in both regions.

Place.	Latitude.	Longitude.	Height in feet.	Coldest Month.	Hottest Month.	Mean Annual Rainfall.
Pittsburg .	40° 32′ N.	80° 2′ W.	873	33·3° F.	72·9° F.	36·6 in.
Cincinnati.	39° 6′ N.	84° 30′ W.	670	32·1° F.	77·7° F.	38·6 ,,
Louisville .	38° 15′ N.	85° 45′ W.	564	34·3° F.	78·6° F.	44·4 ,,
Nashville .	36° 10′ N.	86° 47′ W.	587	37·9° F.	79·3° F.	48·4 ,,

This gives the climate of the Ohio valley.

Place.	Latitude.	Longitude.	Height in feet.	Coldest Month.	Hottest Month.	Mean Annual Rainfall.
New York . .	40° 43′ N.	74° 11′ W.	135	30·2° F.	73·6° F.	43·4 in.
Chicago. . .	41° 53′ N.	87° 37′ W.	837	23·7° F.	72·3° F.	33·5 "
Omaha . . .	41° 16′ N.	95° 56′ W.	1,171	20·5° F.	76·5° F.	30·7 "
Salt Lake City	40° 46′ N.	115° 54′ W.	4,396	28·9° F.	76·3° F.	15·7 "
San Francisco	37° 48′ N.	122° 26′ W.	190	49·5° F.	59·4° F.	22·4 "

These figures show how the climate varies along the Union Pacific line. They illustrate (i) the Atlantic, (ii) the Lake, (iii) the steppe, (iv) the desert, and (v) the Pacific climates. The height of each place must be taken into account, and local causes sometimes explain a figure which seems too high or too low. The cool summer of San Francisco is explained by a cold current along the Californian coast (§ 1188).

Place.	Latitude.	Longitude.	Height in feet.	Coldest Month.	Hottest Month.	Mean Annual Rainfall.
Portland (Or.)	45° 32′ N.	122° 43′ W.	102	39·0° F.	66·4° F.	46·1 in.
San Francisco	37° 48′ N.	121° 36′ W.	190	49·5° F.	59·4° F.	22·4 "

These figures show the difference between the climate of the Pacific coast in the cool temperate belt and of San Francisco in the Mediterranean belt.

1263 Development of the United States. The United States illustrate on a larger scale the changes which have been described in Canada. Both countries were settled from the Atlantic coast, and the first settlers exploited the natural resources of a forested country with good harbours. As agriculture developed settlement pushed west into the treeless prairies, where stock-raising, wheat-growing, and finally manufactures became important. States which were thinly settled half a century ago are now densely peopled, and covered with industrial towns, and the farming industries are being pushed farther west. As new land becomes scarce many emigrants leave the United States for the prairie provinces of Canada. In the United States, as in Canada, gold was discovered in the Cordilleran region, and attracted emigrants to the Far West. The increased demand for food led to a rapid growth of agriculture in the fertile valleys opening to the Pacific coast.

1264. The Eastern States. The Eastern United States were colonized from the coast, but settlement rapidly spread inland by the Appalachian valleys. The Eastern States are in more than one natural region, and this gives them a combination of advantages. They form (i) New England (Maine, New Hampshire, Massachusetts, Rhode Island, and Connecticut opening to the Atlantic, and the inland State of Vermont); (ii) the Middle Atlantic States (New York and Pennsylvania, with a coast-line on the Great Lakes as well as on the Atlantic, and New Jersey, Delaware, and Maryland opening to the Atlantic); (iii) the Southern Atlantic States (Virginia, North and South Carolina, Georgia, and Florida); (iv) Alabama, opening to the Gulf coastal plain; and (v) the inland Appalachian States (West Virginia, Kentucky, and Tennessee).

1265. The Atlantic States, as far south as Maryland, have good harbours, for the coast has sunk and drowned the valleys. The coastal plain is narrowest in the north, where the harbours are best, but this is more than made good by the command of the best routes across the Appalachians to the Great Lakes and the interior. South of the Chesapeake, which is also a climatic boundary (§ 1262), the coast has risen, and though the plain is broader the soil is less fertile. The climate suits cotton, one of the most valuable plants in the world. The Atlantic harbours face the great cities of Europe, which send them immigrants, ensure

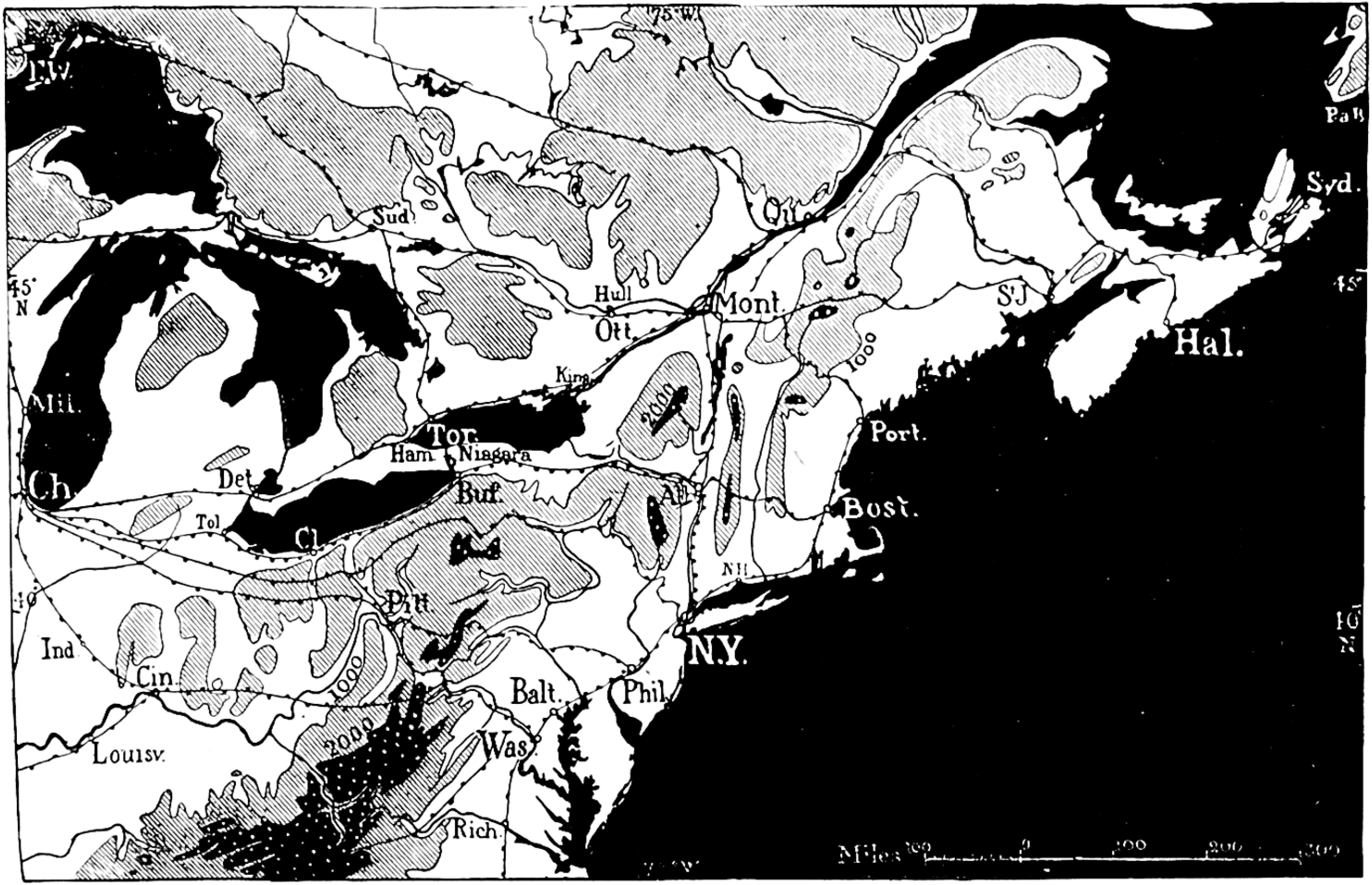


Fig. 92. Routes Across the Appalachians from the Great Lakes to the Atlantic.

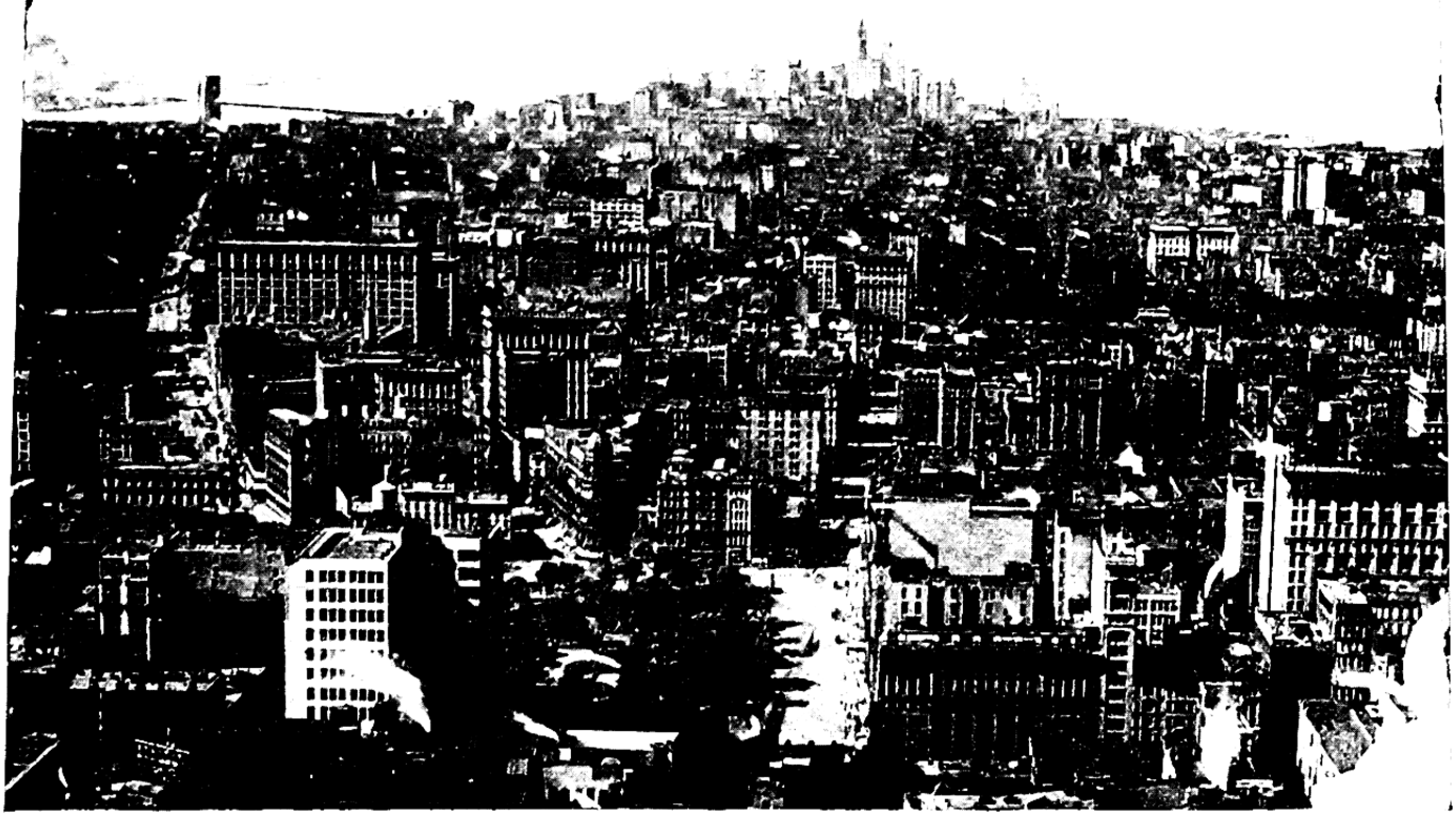
them a supply of labour, and are growing markets for their manufactured goods. The Appalachians, though a barrier to settlement, supply many raw materials, including coal, and give the rivers a sufficient fall to make them valuable sources of power. The importance of the latter fact is shown by the position of the principal manufacturing towns along the 'fall line'.

1266. New England. New England consists of the northern part of the Appalachian Highlands and the coastal plain to which they sink. Originally it was a forested region like New Brunswick, and the same occupations were carried on (§ 1225). As settlement grew New England became first an agricultural and then a manufacturing region, and small fishing towns grew into great ports along the indented coast. Cotton, which can be cheaply brought by sea from the Southern States, is manufactured wherever the rivers form falls in their descent to the coast, or where coal can be cheaply procured. Fall City (110,000), the largest cotton town, combines the advantages of many New England industrial cities. The river falls 130 feet in half a mile, supplying water and electric power, and the fine drowned harbour admits the largest vessels, so that raw material can be brought to the doors of the mills, and manufactured goods cheaply exported. Labour is supplied by French Canadian and Irish immigrants. Other cotton towns are Manchester (N.H.), Lowell (Mass.) on the Merrimac, and Providence (R.I.). Clocks and watches are made at Waterbury (Conn.), and machinery and hardware at Worcester and Springfield (Mass.), and Hartford (Conn.). Hartford is also the market for the tobacco grown in the broad Connecticut valley, which opens north between the forested White Mountains of New Hampshire and the Green Mountains of Vermont. These attract tourists in summer and supply lumber and other raw material. Spruce bark is used in tanning leather, and this makes the boot and shoe manufacture important, especially in Massachusetts. Wool is sent from the Appalachian farms and the Ohio valley to Boston, the largest wool market, where much is manufactured, and maple sugar is distilled into rum.

1267. Boston, on the best natural harbour, where several drowned valleys meet, is the largest manufacturing city. It is connected by rail with Lake Erie through Albany and the Mohawk valley, but the routes are difficult, and the Hoosac tunnel (4½ miles) is the longest in the United States. Boston exports pork, beef, and cattle, as well as manufactured goods. In the neighbourhood is Harvard, the oldest University, and Yale, the second, is near New Haven, a port of Connecticut. Providence is the port of Rhode Island, and Portland (Me.), an ice-free harbour, is a terminus of the C. P. R.

1268. The Middle States. These have the same advantages as New England, but command easier routes across the Appalachians to the Great Lakes. The manufacturing towns are where the rivers form falls as they leave the piedmont belt, and are on or near good harbours.

1269. New York is pre-eminent both as a manufacturing city and a port because of its position where the routes across the Atlantic reach a fine harbour at the end of the best natural route across the Appalachians. The sinking of the land has cut off Manhattan, Long Island, and other islands from the mainland, and formed sounds, which are locally called rivers. The Hudson, between Manhattan and the mainland, the valley of which is also deeply drowned, is a true river. New York has spread from Manhattan,



Photograph by Underwood & Underwood.

Fig. 93. New York.

Notice the 'sky-scrapers' twenty or thirty stories high. They require a steel framework to carry their great weight. The river is the East River, separating Manhattan Island, on which is New York, from Long Island, on which is Brooklyn. Brooklyn Bridge is shown, and there are other suspension bridges above it. The Hudson is not yet bridged at New York. It separates New York from Jersey City and the State of New Jersey.

where it was founded by the Dutch as New Amsterdam, to the adjoining mainland and islands. The business quarter is still on Manhattan, and as space is limited buildings are steel 'sky-scrapers', many twenty stories or more high. Manhattan is connected with Brooklyn on Long Island by suspension bridges, ferries, and tunnels below the East River. The Hudson is too wide and deep to be bridged, but a tunnel below it connects Manhattan with the mainland.

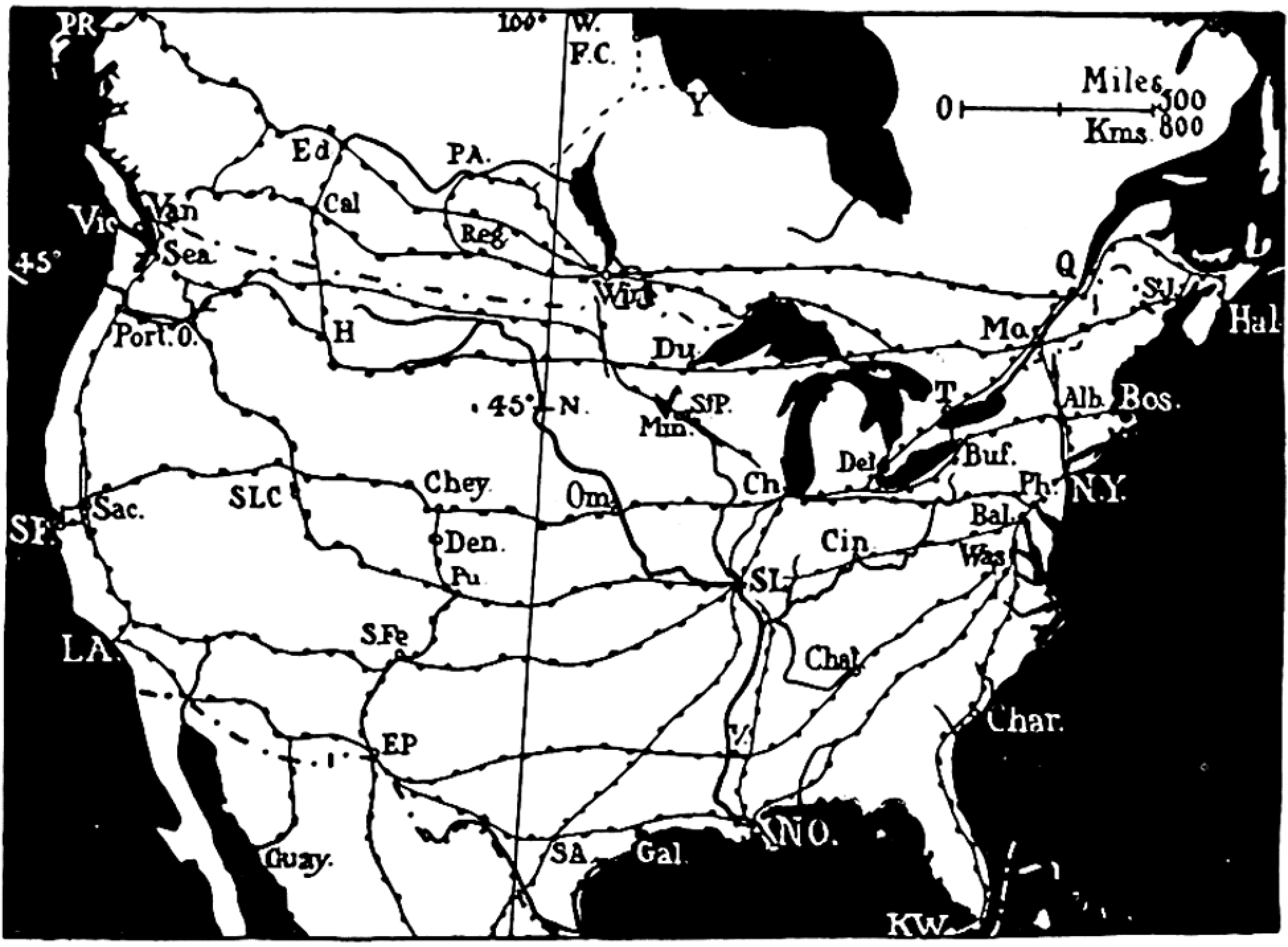


Fig. 94. Main Railway Routes of Canada and the U.S.A.

New York is the centre of all the important railways of the United States, which are shown in Fig. 94, and is the second port of the world. It commands two great routes: (i) by the Hudson-Champlain-Richelieu route (§ 1233) to Montreal and the St. Lawrence, and (ii) by the Hudson-Mohawk route to Lakes Ontario and Erie. The latter, which is under 450 feet high, is followed by the Erie Canal and the New York Central Railway. The canal is too shallow for modern needs, but will be replaced by a ship canal which will allow large vessels to pass inland to Chicago. New York is better placed than any other city for obtaining raw material and coal, and is the chief manufacturing city. Anthracite or smokeless coal is burned, and is abundant in the Eastern Appalachians. New York exports meat, cattle, wheat, flour, petroleum, machinery, cotton and other manufactured goods, and is the natural outlet for all the produce of the interior. It is also the port to which the great majority of immigrants go, and labour is therefore always abundant.

1270. Philadelphia, on the Delaware, the third city, is a river port 100 miles from the sea, but can be reached by the largest steamers. It has not grown so fast as New York, because the routes across the Appalachians, by which it obtains most of its coal and raw material, are much more difficult. Carpets, made from Ohio wool with coal and petroleum from the Pennsylvania coalfield, cotton goods, locomotives, steel ships, tanning and leather, oil-refining, &c., are among its numerous manufactures.

1271. Delaware, Maryland, and Virginia are in a farming belt, and grow much tobacco and fruit, the latter chiefly round Chesapeake Bay. Richmond (Va.) has large tobacco factories. Baltimore, 160 miles from the sea on a drowned valley opening to Chesapeake Bay, with many manufactures, is the northern port of the cotton belt. The lobster and oyster fisheries of Chesapeake Bay are very important.

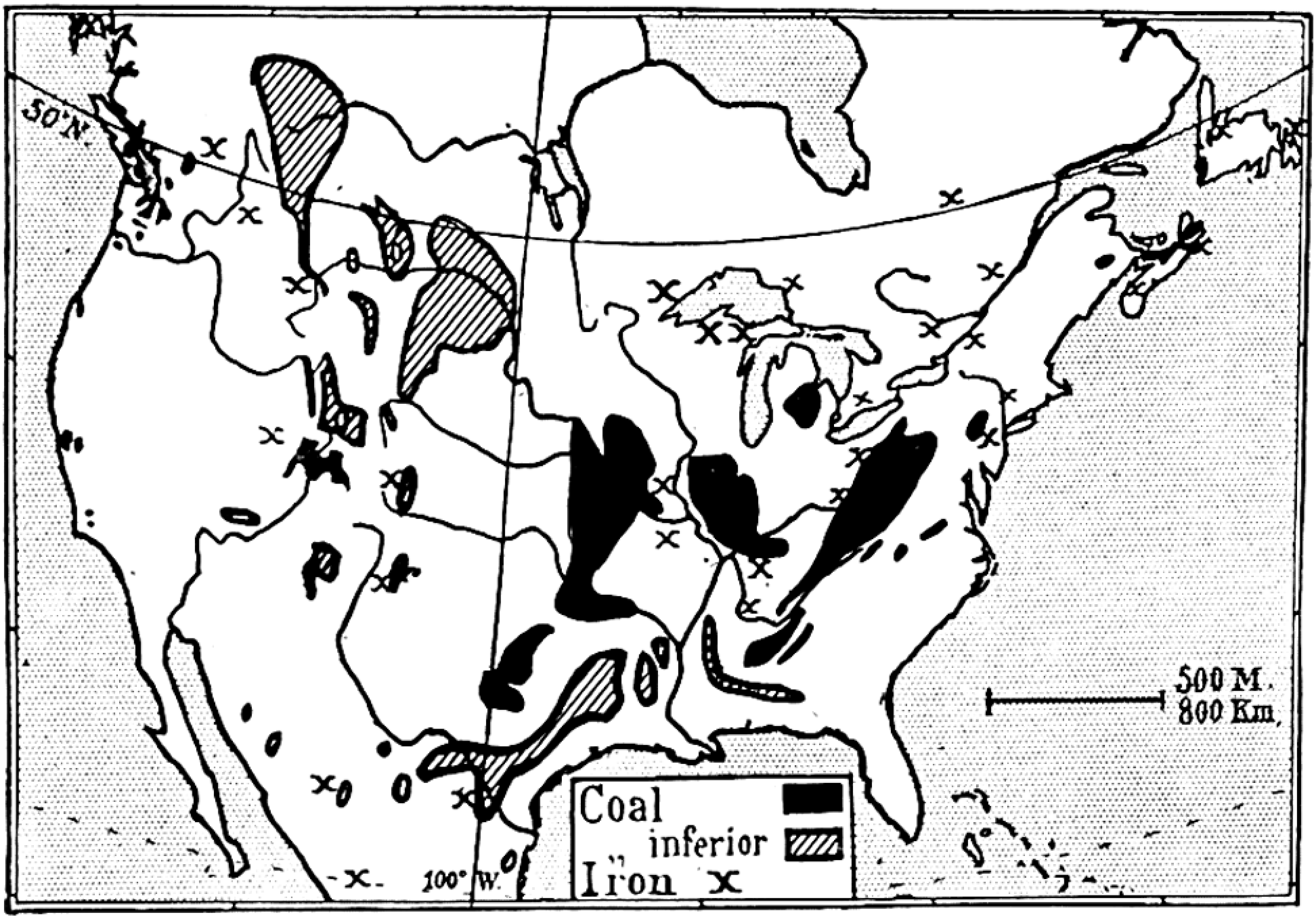


Fig. 95. Distribution of Coal in the United States.

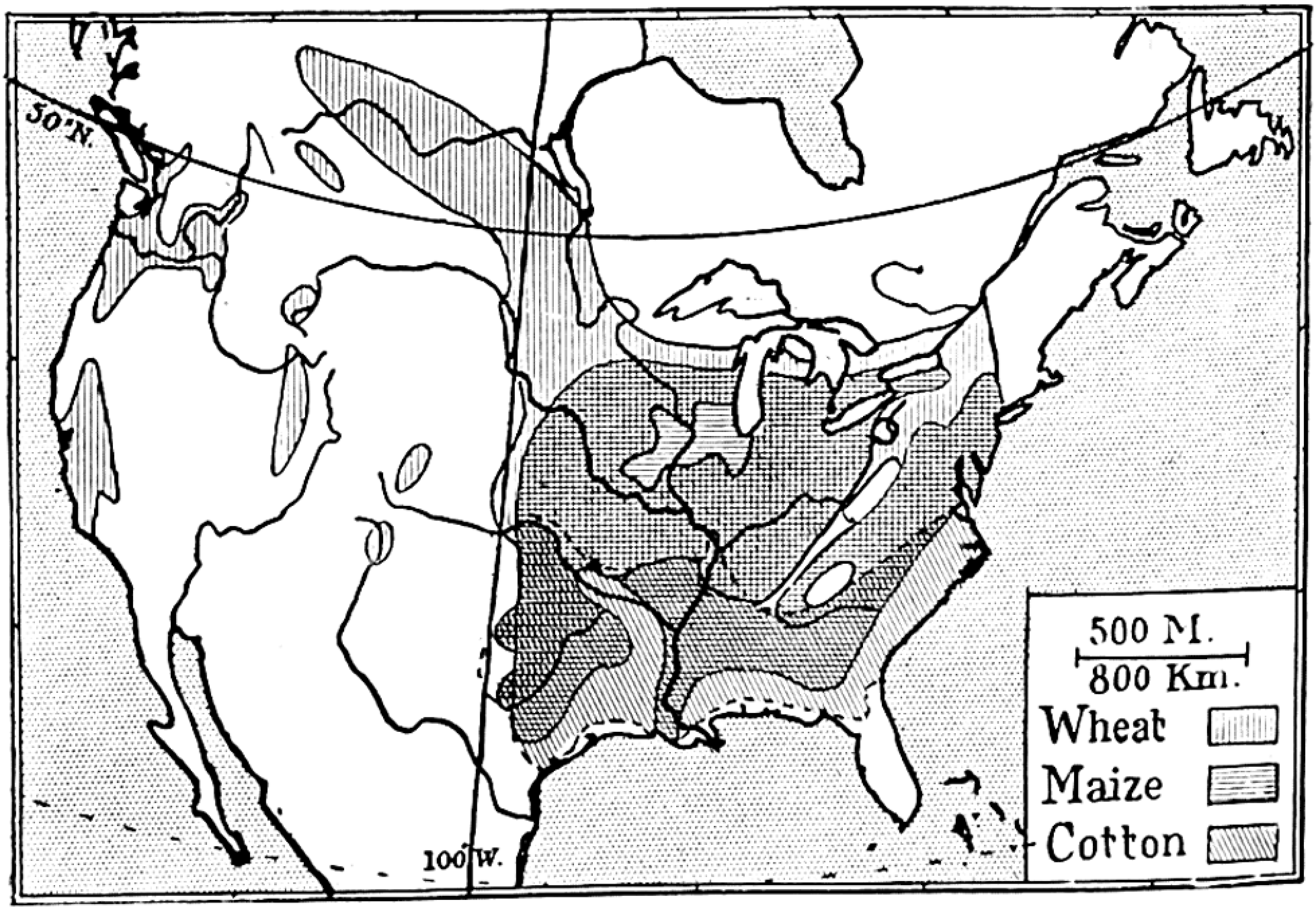


Fig. 96. Chief Crops of the United States.

1272. Washington, the federal capital, is at the head of the tidal navigation of the Potomac. The surrounding country (60 square miles) forms the district of Columbia, and is under federal control. Washington is the seat of Congress, the United States Parliament, and the residence of the President.

1273. The Southern States. South of Chesapeake Bay deep drowned valleys are not found, and there are few good harbours. The low coast, which is slowly rising, is fringed in the north with lagoons and spits of sand (Cape Hatteras), and farther south with low sandy islands on which the sea-island cotton of South Carolina and Georgia is grown. This is exported from Charleston (S.C.) and Savannah (Ga.). Inland is a dry sandy belt, with forests of Georgia pine and other evergreen trees, and lumber (yellow pine), resin, and turpentine are exported from Wilmington (N.C.). Beyond this is the piedmont belt, where the rivers form falls and supply power to the many cotton towns. The largest are Atlanta and Augusta (Ga.), Raleigh (N.C.), and Montgomery (Ala.).

1274. Florida is a land of swamps and forest, and the shallow Everglades are being drained and converted into agricultural land. The climate is tropical, and all fruits can be grown. Key West, on a coral island connected by rail with the mainland, makes cigars from tobacco grown in Cuba, and is a naval station.

1275. The Great Lake Region. New York State, Pennsylvania, Ohio, and Michigan have exceptional advantages, for they open to the Great Lakes, and have easy communication with New York, their port, by the Mohawk-Hudson valley. Coal is abundant in the western Appalachians in Pennsylvania and West Virginia, which form one of the richest coalfields in the world.

Natural gas and petroleum are also found on the Pennsylvania coalfield. Very pure iron occurs at the surface round Lake Superior, and copper is abundant. These minerals, with lumber from the forests of Michigan and Wisconsin, are cheaply carried to the ports of Lake Erie, and sent thence by rail to the Pennsylvania coal towns. The chief lake ports are Buffalo (N.Y.), on Lake Erie, at the end of the Erie Canal, which has cheap electric power from Niagara Falls, and is becoming the centre of an industrial district; Cleveland (O.), which builds steel ships for the lake trade, manufactures iron and steel, refines oil, &c.; and Toledo (O.), with similar industries on a smaller scale. Pittsburg, on the Pennsylvanian coalfield, the greatest iron town of the United States, is built where the Monongahela and Allegheny Rivers unite to form the Ohio, and thus commands easy routes to the Mississippi as well as to the Great Lakes and New York. Glass-making was its earliest industry, because a fine sand for polishing glass was found in the neighbourhood. Pittsburg telescopes are still famous. Its blast furnaces are the largest in the world, and its iron works make armour plates for battleships, steel bridges, rails, locomotives, and every kind of steel and iron goods.

1276. The Southern Appalachian States. West Virginia, Kentucky, Tennessee, and Alabama are still thinly settled except on the coalfields and in the lowlands. In the Appalachian region the slopes are steep, the soil is thin, and all the routes are difficult. After heavy rains the rivers, which flow in steep narrow valleys, rise 30 or 40 feet, and often sweep away roads and bridges. The lowlands are covered with alluvium brought down by tributaries of the Ohio, and are largely planted with tobacco and maize. Fine horses are bred in the blue-grass belt of Kentucky. Louisville (Ken.), on the Ohio, is the largest market for leaf tobacco, and distils whisky from Kentucky grain. Barrels to hold it are made from timber grown in the Appalachian forests.

1277. Coal, iron, and limestone are found together in Alabama, at the southern end of the Appalachians. The iron manufacture is important round Birmingham (Ala.), named after its English rival.

1278. The Northern Forest Belt. The forest belt of Canada extends south into the United States, and much remains uncleared in Minnesota, Wisconsin, and Michigan, which have a long coast-line on the three upper lakes. The trees are both evergreen and deciduous, and their lumber is shipped east from the Lake ports, the largest of which are Duluth at the western end of Lake Superior; Milwaukee (Wis.) and Chicago (Ill.) on Lake Michigan, the largest inland city of the United States; and Detroit on the Detroit River, between Lakes Erie and Ontario. All these have special advantages for manufactures and trade.

1279. Chicago. Chicago owes its rapid growth to a combination of geographical advantages. Lake Michigan, which is 350 miles long, interrupts communication between east and west and obliges all routes to pass south of the lake, just as Canadian routes must pass south through Winnipeg. Chicago began as a small post on the edge of the settled country, and was built where a small stream, rising near the Illinois tributary of the Mississippi, enters Lake Michigan. The site is low and swampy, but the command of routes by the Mississippi, as well as by the Great Lakes, led to its rapid growth. All the chief routes of the United States converge on it, and it is the greatest railway centre in

America. Like Winnipeg, it links the farming and grazing prairies of the west with the industrial east, but its position on the Great Lakes is an advantage which Winnipeg does not possess. Chicago is the greatest meat market in the world, and slaughters by machinery millions of pigs fattened in the maize belt and millions of cattle grazed in the prairies. The flesh is canned for the European market or dressed for the home market, the fat is made into lard and soap, the hides are tanned for leather, the hoofs made into glue, and the blood and bones into artificial manure. Chicago is also a great market for the wheat and flour of the prairies, which give rise to another group of industries. Flour-barrels are made out of Michigan lumber, breakfast foods and biscuits are made of grain and flour, as well as starch, glucose, and beer. Chicago is near several coalfields, and iron is cheaply brought by the lakes. Railway plant, farming machinery, and everything that can be made of wood, or iron, or both, are manufactured on a large scale.

1280. The Prairie States. Indiana, Illinois, the western half of Ohio, Kentucky, and Tennessee east of the Mississippi, Iowa, Missouri, North and South Dakota, Nebraska, Kansas, and Oklahoma west of the Mississippi, are the chief prairie States. They are treeless and need no clearing, and so level that large farms can be economically worked by machinery. The northern half is covered with boulder clay and is a wheat-growing region. The best wheat lands are in North and South Dakota, in the Red River valley, formerly the basin of a glacial lake (§ 1239). Flour is milled at many centres, and especially at Minneapolis, where many routes reach the Mississisippi and St. Anthony's Falls supply cheap power. Minneapolis is also a market for the lumber of the forest belt, and manufactures much into flour-barrels. Together with St. Paul it forms one great double city, carrying on many industries, and well placed at the head of the Mississippi navigation. Much wheat is sent east, either for manufacture or export. Duluth is the chief wheat-exporting port. Milwaukee (§ 1278) is the second milling centre, and uses enormous quantities of grain in its breweries.

1281. Maize requires a longer warm season than wheat and is spoiled by late frosts. It is grown south of the wheat belt, and to save carriage is largely used to fatten stock, and especially swine. This transforms a cheap crop into highly priced meat, and secures abundance of manure for the land, which would otherwise become exhausted. A great meat industry has grown up in the maize belt, and the centres have moved west in the same way as in Canada. Half a century ago Cincinnati on the Ohio, often called Porkopolis, was the most western centre, but though it still does a large meat trade it now supplies the prairies with locomotives, machinery and other steel and iron goods, wagons, every kind of furniture, boots, shoes, and every kind of clothing, beer, pottery, artificial manures, soap, and other necessities of life worked up from the raw material which it receives from them. Indianapolis (Ind.) in a region of natural gas and petroleum, Cairo (Ill.) at the confluence of the Mississippi and the Ohio, and Nashville (Tenn.) have similar industries on a smaller scale. The growth of manufactures has been rapid, because coal is abundant between Lake Michigan and the Ohio, and the coalfields extend into many of the prairie states. The chief meat cities are now Omaha, St. Joseph, Kansas City, the largest meat city west of Chicago, in the centre of the maize belt, and St. Louis. All work up the products sent to market, and St. Louis, which also manufactures tobacco and makes beer, is one of the largest industrial and railway centres of the middle west.

1282. The Cotton Belt. Texas and the States south of the Ohio are in the cotton belt and have few large towns. The warm winters allow the harvest to be gathered from September to December. The chief cotton ports are Mobile and Pensacola (Ala.), New Orleans (La.) at the head of the Mississippi delta, and Galveston (Tex.). The last is built on a low sandy coast, exposed to hurricanes and tidal waves, but an outlet for Texas cotton is needed and thus a poor port has an artificial advantage. Memphis, the largest town on the Mississippi between St. Louis and New Orleans, and Vicksburg manufacture cotton.

1283. The Ranching Prairies. The western prairies, like Alberta, are high and dry, and are better adapted for grazing than agriculture. Cattle, horses, and sheep have replaced the great herds of bison which once grazed these lands, and supply raw produce to the meat cities already named. Texas, the largest of the United States, bigger than France, Belgium, and the Netherlands together, is partly in the cotton belt and partly in the grazing belt. It has long dry summers and short winters, and is swept by hot south winds from the Gulf, and by cold 'northers' which injure both stock and crops. Cattle and petroleum rank next to cotton among its products. On the north-west is the high dry Staked Plain, on the margin of the arid region of New Mexico.

1283a. In the vast lands west of the Mississippi the ground becomes intensely heated in summer and much chilled in winter. This affects the winds in different regions and at different times of the year. In summer eddying storms or tornadoes often rage west of the Mississippi and do great damage. In winter cold 'blizzards', with fine drifting snow, blow in the north-west prairies. The cold is far below freezing point, and many animals perish. 'A guide of rope is needed even going a few hundred yards from a house to a barn during one of these freezing, blinding storms.'

1284. The Cordilleran Belt. The Cordilleran States are shown in any atlas. Their mountains and dry intermont plateaus are described in Chapter III, and their climate in Chapter IV. Mining is the chief occupation, and minerals, especially gold, are widely distributed. Denver (210,000), the largest town between the Mississippi and the Pacific cities, at the eastern base of the Rockies, is the market for many rich mining valleys which open to it. Butte (Mont.) has the most productive copper mines in the world, and lead is mined at Leadville. Mining does not lead to permanent settlement, or a high civilization, and when mines cease to pay mining regions decline.

1285. Parts of the dry plateaus are irrigated, and the soil, which is rich in natural fertilizers, is then very productive. Salt Lake City in Utah (93,000) owes its prosperity entirely to irrigation. Many projects for extending irrigation in this dry region are under consideration, and the drought-resisting qualities of different crops is being carefully studied.

1286. The Western Valleys. Fertile valleys lie west of the high Southern Cascades and the Sierra Nevada, and open north and south to good ports on the Pacific. In the north the Willamette valley, which produces wheat and northern fruits, opens to Portland, 100 miles up the navigable estuary of the Columbia. The finest peaks of the Cascades are seen from the streets of the city and from the surrounding mountains. The salmon fisheries of the Columbia are very important, and there are canneries at Astoria at the mouth of the river. Seattle and Tacoma, both on the drowned fiord of Puget Sound, are also very busy ports. This region may be compared with the south of British Columbia.

1287. South of the Columbia there is no good harbour till San Francisco on the Golden Gate, opening to a magnificent bay, is reached. This alone would have marked out San Francisco as the terminus of a line across the continent, and the starting-point of steamer routes across the Pacific to Japan, China, Australia, and the South American ports. San Francisco is also the outlet for the rich valley of California, between the Coastal Range and the Sierra Nevada, drained south by the Sacramento and north by the San Joaquin River. This valley is covered with deep fine soil, and may be an old lake basin. It has a Mediterranean climate, and produces oliveyards, orange and lemon groves, and fine vineyards, from the grapes of which California wines are made. The opening of the Panama Canal will increase the importance of San Francisco. Los Angelos is the second port.

Exercises

1. Compare the climate of the United States with that of Canada. Construct tables to illustrate your answer. What effect is this likely to have on the density of population?
2. Why are most of the large cities of the United States east of the Mississippi?
3. Divide the United States into natural regions, and show which part of the Old or New World each resembles.
4. How far has geographical position helped the growth of the following cities: Buffalo, Chicago, Duluth, Fall City, Minneapolis, New York, Pittsburg, San Francisco?
5. Describe the chief occupations of each of the preceding, and show how far they depend on local conditions.

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CHAPTER VIII

MEXICO, CENTRAL AMERICA, AND THE WEST INDIES

1288. Mexico. Mexico (776,000 square miles) is a high plateau, 1,200 miles long from north to south, enclosed between the high Western Sierra Madre, a continuation of the Wasatch Mountains (§ 1163), and the lower Eastern Sierra Madre, a continuation of the Rockies. These are connected by a chain of high active and extinct volcanoes (§ 1163), which sink to the Isthmus of Tehuantepec, between North and Central America, where the continent narrows to 130 miles. The plateau between the Sierras continues the intermont plateaus of the United States (§ 1163). The north is a basin of inland drainage, where the rivers end in salt lakes and swamps; but the south forms the high plateau of Anahuac (6,000–7,000 feet), which is covered with fertile alluvium brought down by the rivers, and contains nine-tenths of the population and all the chief towns. Mexico also includes the high Californian Peninsula and the low Peninsula of Yucatan projecting north into the Gulf of Mexico. The only long river is the Rio Grande, which for 1,100 miles forms the frontier with the United States. The rivers flow in deep canyons, and carry little water in the dry season. They are therefore of little use for irrigation, except in their lower courses.

1289. Climate. Mexico is in the latitude of North Africa and is crossed by the Tropic of Cancer. It is in the belt of trade-wind deserts, but is high and narrow and therefore much less arid than the Sahara.

Station.	Latitude.	Longitude.	Height in feet.	Coldest Month.	Hottest Month.	Mean Annual Rainfall.
Mazatlan .	23° 0′ N.	106° 25′ W.	250	66·7° F.	82·2° F.	31·4 in.
Vera Cruz .	19° 12′ N.	96° 8′ W.	50	69·6° F.	81·7° F.	67·9 ,,
Mexico City	19° 26′ N.	99° 8′ W.	7,475	53·4° F.	65·4° F.	23.2 ,,
Oaxaca . .	16° 57′ N.	94° 42′ W.	5,165	63·0° F.	73·6° F.	32·1 ,,

Mexico has a climate like that of the intermont plateaus of the United States. Vera Cruz on the east coast, exposed to the prevailing winds, has hot winters, very hot summers, and heavy rains; but Mazatlan and Oaxaca on the west coast are much drier, though equally hot at sea-level. The interior is still drier, as shown by the figures for Mexico City. Few figures are available for the driest regions, which are uninhabited. The wettest months are May, June, October, and November, and little rain falls at any other season.

1290. There are three well-marked climate belts, which are also found in Central America: (i) the hot belt, or *tierra caliente*, up to 3,000 feet; (ii) the temperate belt, or *tierra templada*, up to 5,000 or 6,000 feet; and (iii) the cool belt, or *tierra fria*, still higher. The coastal plains and the wetter parts of the *tierra caliente* are densely forested with palms, rubber, mahogany, rosewood, and other tropical plants. In the clearings cotton is grown on the Pacific coast, and coffee, sugar, and cacao on the mountain slopes. The pineapple, banana, mango, orange and other tropical fruits grow wild. The *tierra templada* has evergreen oaks and pines, and tobacco, beans, maize, wheat, and potatoes are grown at suitable heights. The cactus is the commonest plant in the dry regions, and is often of great size and curious shape. Its milky juice is made into pulque, the commonest Mexican drink. Yucatan, with a climate not unlike that of British East Africa, produces sisal hemp or henequin, the tough fibres of which are made into strong ropes for binding-machines in the wheatfields of Canada and the United States.

1291. Occupations. Very little of Mexico is suited for agriculture, and primitive tools and methods are still used. The staple crops are beans and maize, and little meat is eaten. Mexico is richer in minerals than any other country, and mining is very important. Silver is the most abundant mineral, but gold, platinum, copper, lead, iron, coal, petroleum, and opals are found. Millions of cattle, sheep, horses, and goats are kept on the Anahuac plateau, and their hides are tanned into leather, which is richly ornamented and put to many uses. Blankets are woven of wool; fibres are plaited into cool shady hats; pottery is made of dried clay, and adobe, or sun-dried mud, is used, as in the drier parts of Asia, for building houses and walls. In the larger cities are fine cathedrals and churches, built by the Spanish conquerors.

1292. Routes and Towns. The routes from the coast to the plateau, on which the larger towns are found, are all difficult, owing to the height of the coastal sierras. The Gulf coast is fringed with lagoons and sand-bars, and Vera Cruz and Tampico are the best of its poor harbours. Acapulco and Mazatlan are the best of the Pacific harbours. From these ports lines are carried up the sierras, through fine scenery, to Mexico City, which lies nearly 8,000 feet above the sea, on the site of the ancient Aztec capital. It is shut in by mountains, the highest points of which are the snow-clad volcanoes of Popocatapetl and Iztaccihuatl ('white woman'). Guadaljara, San Luis Potosi, and Zacatecas, are silver-mining towns, and Leon and Pueblo are industrial centres. Merida, in Yucatan, exports sisal hemp.

1293. Central America (173,000 square miles). The small Republics of Guatemala, Honduras, Salvador, Nicaragua, Costa Rica, and Panama, with British Honduras, occupy the narrow neck of Central America, which is separated by the low isthmuses of Tehuantepec (130 miles) and Panama (30 miles) from North and South America. Elsewhere Central America is high, and the Pacific coast is fringed by a line of volcanoes (13,000 feet). Nicaragua (3,700 square miles) is the largest lake, and there are no long rivers.

1294. Climate. Central America lies between the Tropic of Cancer and the equator, and as the sun is always nearly vertical there is little difference in heat between summer and winter. The heavy rains fall chiefly in summer, and are heavier on the east than on the west coast. They are often accompanied by hurricanes and thunderstorms, and during the wet seasons the rivers rise to a great height.

Place.	Latitude.	Longitude.	Height in feet.	Coldest Month.	Hottest Month.	Mean Annual Rainfall.
Belize . .	17° 32′ N.	88° 10′ W.	0	73·6° F.	82·6° F.	81·4 in.
Greytown . (Nicaragua)	10° 55′ N.	83° 43′ W.	20	77·5° F.	80·8° F. (May) 80·5° F. (Sept.)	259·4 ,,
Colon . .	9° 22′ N.	79° 55′ W.	164	79·0° F.	80·1° F.	127·4 ,,
S. Salvador	13° 44′ N.	89° 9′ W.	2,428	77·5° F.	76·2° F. (Apr.)	68·3 in.
San Jose . (Costa Rica)	9° 56′ N.	84° 8′ W.	3,445	65·8° F.	68·9° F. May) 67·6° F. (Sept.)	69·1 ,,

These figures are not reduced to sea-level, and the height and position of each station must be taken into account. The first group are on the Atlantic coast, and have a heavier rainfall than San Salvador and San Jose on the Pacific coast. There is little difference between the summer and winter temperatures at any height, but the climate is cooler in the mountains than on the coast.

1295. Products. The *tierra caliente*, *tierra templada*, and *tierra fria* are found at about the same height as in Mexico. The coastal plain and the lower mountain slopes are densely forested, especially on the wetter east. Cacao is grown along the Pacific coast. The *tierra templada* is forested on the east, but forms savanas or temperate grasslands on the wetter west. Coffee, tobacco, and temperate crops are grown at suitable heights, but agriculture as a whole is backward. Mahogany is abundant in the Atlantic coastal forests, and is exported from Belize in British Honduras.

Fig. 97. Field of Pineapples in Tropical America.

1296. Central America is thinly peopled. The mountainous country and the heavy floods, which often wash away roads and bridges, make communication difficult. The peasant industries include the making of 'Panama' hats from fibres, and of ornamental silver jewellery. The houses are built of adobe, or of bamboos lashed together with fibres and thatched with palm leaves.

1297. The Panama Canal connects Colon on the Atlantic coast with Panama on the Pacific. These towns are in Panama, outside the canal zone, which belongs to the United States, and are about 36 miles apart. The canal, which runs almost due north and south, is nearly 50 miles long. The chief difficulties were (i) the range of hills which separate the two oceans, (ii) the seasonal floods of the Chagres River, which often rise high enough to sweep away the canal, and (iii) disease. The dividing range is pierced at its lowest point by the Culebra cut (250 feet), and locks reach the summit-level (about 85 feet) from both the Atlantic and the Pacific coasts. The Chagres River has been dammed near its mouth and allowed to flood the valleys opening to it, forming a large artificial lake (168 square miles), which acts as a natural reservoir and is low in the dry and high in the wet season. Disease has been stamped out by putting Colon, Panama, and all the canal zone under the control of American doctors. Ships will pass through the canal in about ten hours, and the distance between Liverpool and San Francisco will be shortened about 6,000 miles.

1298. The West Indies. The West Indies curve round from Florida and Yucatan to the South American coast. Cuba (44,000 square miles), Hispaniola (29,000 square miles), Jamaica (4,400 square miles), and Porto Rico (3,600 square miles) form the Greater Antilles, which are the highest parts of a submerged mountain region. The other islands, known as the Bahamas and the Lesser Antilles, are small. Some are low coral islands (Bahamas), but most of the others are high and volcanic. They rise out of deep seas (20,000 feet), and the weakness of the Earth's crust in this region is shown by frequent volcanic eruptions and earthquakes.

1299. Climate. The Tropic of Cancer passes north of Cuba, and the West Indies have a tropical climate.

Place.	Latitude.	Longitude.	Height in feet.	Coldest Month.	Hottest Month.	Mean Annual Rainfall.
Nassau, Bahamas .	25° 4′ N.	77° 20′ W.	62	71·2° F.	82·0° F.	54 4 in.
Havana	23° 9′ N.	82° 31′ W.	49	70·3° F.	81·9° F.	51·7 ,,
Kingston	17° 58′ N.	76° 48′ W.	43	75·7° F.	81·7° F.	37·9 ,,
St. Ann's, Trinidad	10° 35′ N.	61° 30′ W.	66	76·8° F.	79·9° F.	66·8 ,,

The stations given are all on the coast, and the mountains have much heavier rains. The driest station, Kingston, is on the lee coast of Jamaica, and the windward coast has a rainfall of over 100 inches.

1300. Most of the islands are densely forested and thinly peopled, and the negroes are more numerous than Europeans. The trees, which belong to many species, include the banana, the coco-nut, and royal palm and many others. There are many valuable timber trees, and every tropical and temperate crop can be grown.

1300a. The royal palm grows to a height of 60 or 80 feet, and is crowned by great green leaves. The roots are used in medicine; the trunk is sawn into timber for making houses and furniture; its leaves are used for thatching houses. The stem of the leaves, often six feet long, is like a thin board. It is cut into plates, and is wetted and bent into baskets and cooking pots. The seeds are used to fatten pigs. Hats, baskets, and a kind of cloth are made from the fibres of its leaves. The bud enclosed in the tuft of fronds at the top makes a delicious vegetable and is eaten both raw and cooked.

1301. Jamaica ('the land of running streams'), the largest of the British Islands, reaches 7,000 feet in the Blue Mountains, and is densely forested. Sugar is less important than formerly, but Jamaica rum is distilled from it, and Jamaica ginger is preserved with it. Kingston, the capital, on a good harbour, exports bananas, spices (ginger, pimento, nutmeg), oranges and other fruits, coffee and cacao from the cultivated lower slopes of the mountains, and logwood from the forests.

1301a. The other British Islands are (i) the Bahamas, low coral islands, producing pineapples, sisal hemp, turtles, and sponges; (ii) the volcanic Leeward Islands, including Antigua and Dominica, producing sugar, coffee, cacao, tobacco, and arrowroot; (iii) the volcanic Windward Islands, including St. Lucia, St. Vincent, and Grenada; (iv) the low limestone island of Barbadoes, growing cotton and sugar; and (v) Trinidad, a fragment cut off from the mountains of Venezuela, producing asphalt from the pitch lake, and growing cacao.

1302. **Cuba** belonged to Spain till 1898, but is now independent. Its coasts are high and fringed with coral reefs, and the whole island is mountainous and densely forested. Tobacco and sugar are cultivated, and cigars are made at Havana, the capital, on a fine harbour, which is only 100 miles from Key West. Santiago, on the south coast, has also a good harbour. Porto Rico, growing sugar, is a mountainous island belonging to the United States. Hispaniola is divided into the negro Republics of Haiti (French-speaking) and San Domingo (Spanish-speaking). Guadeloupe and Martinique are French; and Holland and Denmark hold small islands.

Exercises

1. Cortes, the Spanish conqueror, wished to name Mexico New Spain from its likeness to his native land. Point out the chief resemblances.

2. Show how climate, height, and vegetation are inseparably connected in tropical America.

3. Write an account of the Panama Canal and its importance as a world route. What countries are likely to benefit most by it, and why?

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1305. The Andes, or Western Cordillera are not yet fully explored or understood. The present foldings are young, but older folded mountains probably existed there in early times. The oldest folded rocks are in the eastern ranges, and the younger rocks in the western. Except in the south the chains are double or treble, and consist of many different ranges, which converge at mountain knots (Pasto, Loja, Pasco) and diverge again. The Andes may be divided into (i) the Caribbean or Venezuelan Andes, connected through the Sierra de Merida with (ii) the Northern Andes, which in Colombia form three lofty chains converging at the knot of Pasto and are continued south through Ecuador as the Eastern Andes (Antisana, 19,000 feet; Cotopaxi, 19,500 feet), and the Western Andes (Chimborazo, 20,500 feet). Both chains are volcanic, and between them is the high plateau of Quito (9,000 feet high, 45 miles broad). The Ecuador Andes converge at Loja (lat. 4° S.), and diverge again as (iii) the Central Andes, the triple chains of which converge at Pasco in Peru, and are continued by the double chain of the Bolivian Andes. These culminate in Aconcagua (23,000 feet), which towers above the Uspallata Pass (12,500 feet) leading from Chile to Argentina. South of the Uspallata Pass are (iv) the Southern Andes, a single chain, rarely over 10,000 feet high, sinking to a fiord and island coast like that of British Columbia.

1306. Long valleys and high plateaus lie between these parallel chains. The Atrato, Cauca, and Magdalena flow north between the parallel ranges of the Northern or Colombian Andes to the Caribbean Sea. The long valleys between the parallel ranges of the Peruvian Andes are filled by the Marañon, Huallaga, Ucayali, and other Andean feeders of the Amazon. Between the parallel chains of the Bolivian Andes lies the puña, or high plateau of Bolivia (12,000 feet). This was probably once a vast lake, of which Lake Titicaca (3,300 square miles) and Lake Aullagas or Poopo are fragments. This great lake must have caused much evaporation (cf. § 1313) and made the climate more equable and less dry than at present.

1307. The Guiana Highlands. The Guiana Highlands consist of two masses separated by the valleys of the Essequibo, flowing to the Atlantic, and of the Branco, flowing to the Amazon, which form a trough across the highland region. The Guiana Highlands reach 11,000 feet, and are much dissected by the valleys of the rivers, which descend in falls. Roraima, a great table of red sandstone, reaches 8,600 feet, and sends streams to the Essequibo, the Orinoco, and the Amazon.

1308. The Brazilian Highlands consist of old sandstones and older crystalline rocks, and in the plateaus of Goyaz and Matto Grosso form the divide between the Amazon and the Paraguay-Parana. Rivers flow across them in valleys eroded in the softer rocks. The São Francisco takes a long course northward to the Atlantic, and the Parana and Uruguay flow south to the Plate estuary. South of this trough old rocks reach the sea and form a rocky coast with many bays, of which Rio de Janeiro is the most beautiful. The highest parts of the Brazilian Highlands (11,000 feet) are drained to the Amazon (Tocantins, Araguay, Xingu, Tapajoz) or to the Parana.

1309. The Central Plains. These are the largest lowlands in the world, and are drained in the north by the Orinoco, in the centre by the Amazon, and in the south by the Paraguay-Parana to the Plate estuary. The divides between their tributaries are often low, and in the rainy season the flooded plains are drained to more than one of the great rivers. Much of the deep alluvial soil is as fine as that of the Red River valley (§ 1239), and is broken by hardly a stone. The Central Plains form the savanas or tropical grasslands of the Orinoco and the Guiana and Brazilian Highlands (llaños, campos), the selvas or hot wet forests of the Amazon, and the savanas and steppes (pampas) of the Plate basin.

1310. The Andes. The Andes, like all young mountain regions, contain grand scenery. High peaks rise far above the snow-line, and the rivers flow in deep gorges between high mountain walls, and form magnificent falls in their downward rush to the Pacific or to the Central Plains. There are innumerable peaks above 20,000 feet, and nearly all the passes are very high. The Uspallata Pass, which carries the Trans-Continental Railway from Buenos Aires in Argentina, on the Atlantic, to Valparaiso in Chile, on the Pacific, though over two miles high, is the lowest pass for several hundred miles. In the broadest part of the Andes not one but many high passes have to be crossed.

1311. The High Andean Plateaus of Bogota in Colombia, Quito in Ecuador, and Bolivia, are covered with deep alluvial soil brought down by the rivers which flow from the snow-clad peaks which shut them in. The sun is always nearly vertical, and the climate is extreme and dry. The heat is very great during the hours of sunlight, but the nights are cold. The rivers supply water for irrigation, but only cool temperate crops can be grown.

1312. Mineral Wealth of the Andes. The Andes, like the North American Cordillera, are rich in minerals, especially in silver and gold, and the silver mines of Pasco in Peru, near the sources of the Huallaga. and of

Potosi in Bolivia, are as rich as those of Mexico. The nitrate fields of the Atacama desert in Peru and Chile yield valuable fertilizers.

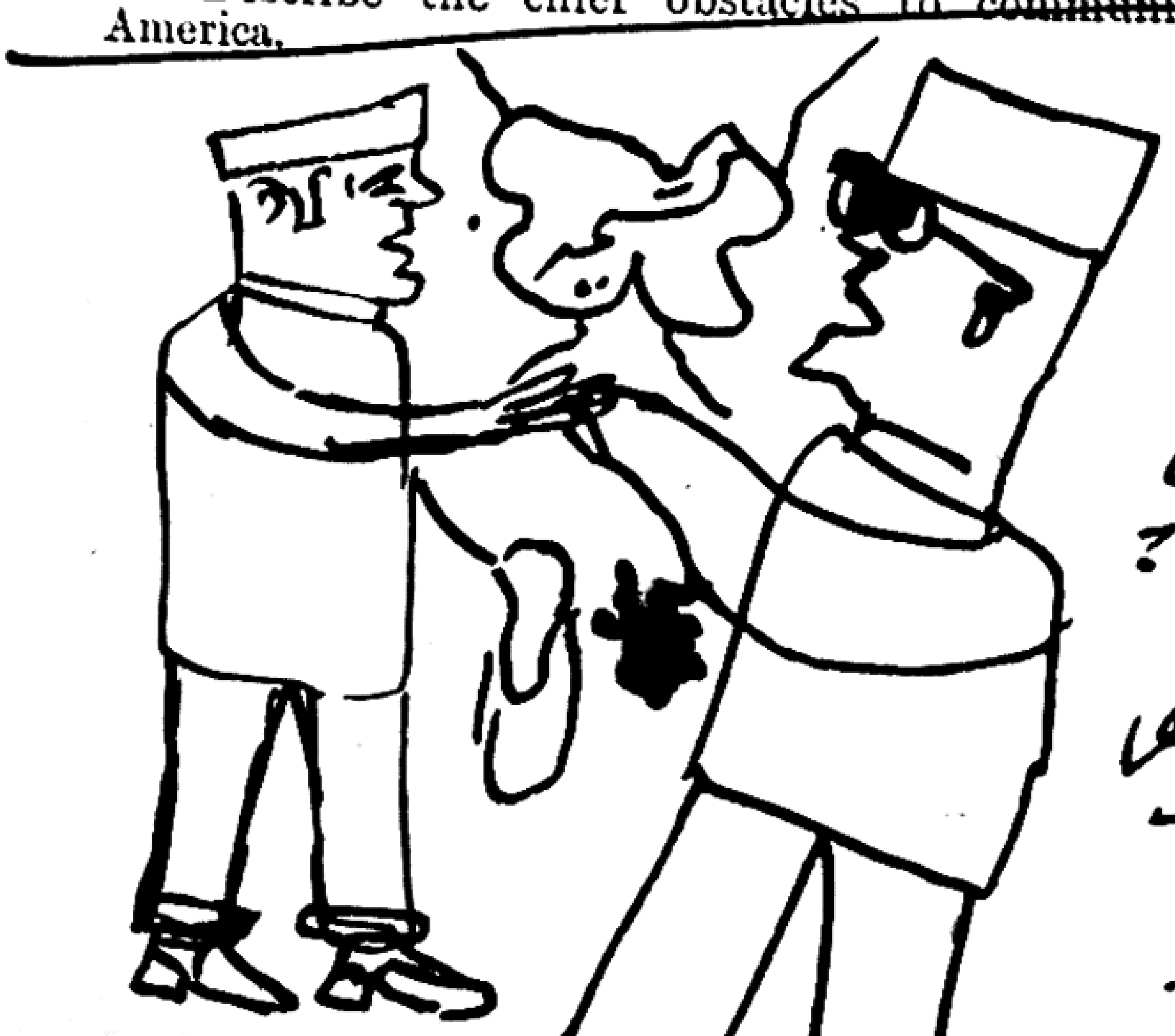
1313. Ancient Civilizations of the Andes. High plateaus in tropical latitudes are more suitable for settlement than the hot moist coastal plains. The Mexican plateau was the home of the Aztecs, and in South America the Andean plateaus of Peru and Bolivia formed the empire of the Incas, who had reached a high pitch of civilization. The people were skilled workers in metals, and used an alloy of tin and copper which took as fine an edge as steel. They terraced the mountain slopes, irrigated the land and built imposing cities, in which gold and silver were put to daily domestic use. When first settled the Bolivian plateau was probably less dry and better fitted for agriculture (§ 1306) than it is now.

1314. Railways. A transcontinental line has been built across South America in temperate latitudes, where the continent is narrowest and where only a single pass has to be crossed. The line tunnels (2½ miles) below the Uspallata Pass at a height of 10,300 feet. Railways are rapidly growing in the temperate lowlands, and are carried from the Atlantic and Pacific coasts into the highlands. Andean railways are difficult to build, because of the great height of the passes, the number of rivers and ravines to be bridged, the many ranges to be crossed or tunnelled through, and the difficulty of working in the thin air at great heights. Lines run from Arica, Mollendo, and Antofagasta, on the Pacific coast, by passes over 14,000 feet high, to Lake Titicaca, on the Bolivian Plateau, for La Paz, the capital, but much traffic still goes by mules and llamas, a slow but cheap method of carriage. A railway will probably be built from north to south through the Andean valleys, to connect the present railways from the coast and make a great through route. A shorter transcontinental line is also projected to unite Rio de Janeiro with the Bolivian lines and their Pacific ports.

1314a. A number of lines have been projected to bring the Pacific Coast into direct communication with the navigable affluents of the Amazon. The most northern would run from Paita, in Peru, to the river port of Limon on the Marañon, crossing the Andes at the height of about 6,500 feet. This line would be about 420 miles long. A second line would run from some point on the Oroya-Pasco line to a river port of the Ucayali, which is navigable for small steamers below Iquitos. This line would be 100 miles shorter, but would be carried to more than twice the height. The third line would be built from the Mollendo railway to the Madre de Dios, which falls into the Madeira, a great tributary of the Amazon. This line would be 240 miles long, and would cross the Andes by a very high pass. The Paita route, though the longest, would be the cheapest to build and work, and would also be nearest to the Panama Canal.

Exercises

1. Compare the relief of North and South America.
2. Write a description of the structure of the Andes, illustrated by a sketch-map.
3. What are savanas? Where are they found in the New World? With what distinctive type of climate are they associated? How do they differ from steppes? For what occupation are they best fitted?
4. Point out any common features in the prehistoric civilizations of Mexico and Peru.
5. Describe the chief obstacles to communication in South America.



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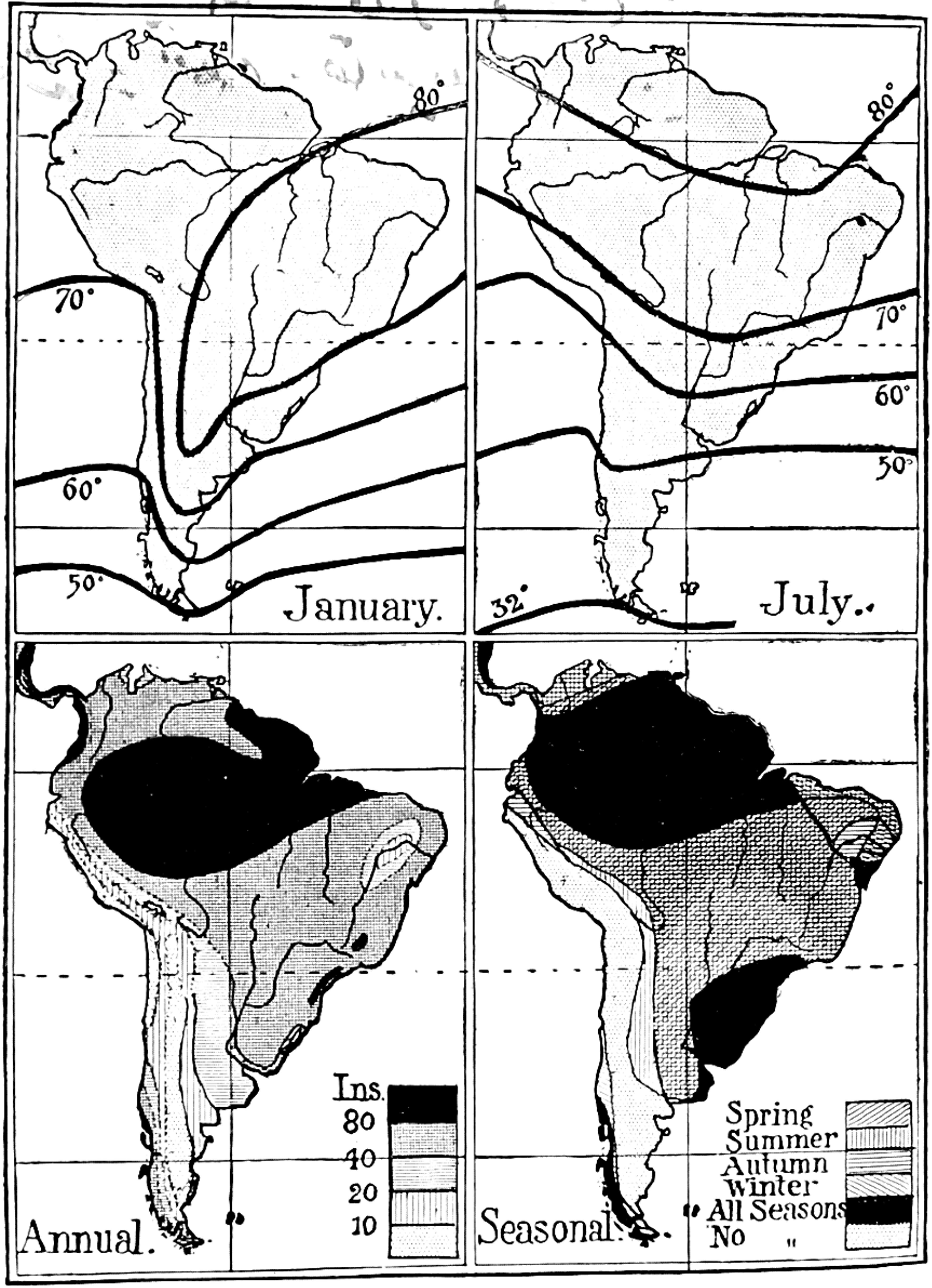

Fig. 101. January Isotherms of South America.
Fig. 102. July Isotherms of South America
Fig. 103. Mean Annual Rainfall of South America.
Fig. 104. Seasonal Distribution of Rain in South America.

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CHAPTER X

CLIMATE, PLANTS, AND ANIMALS

1315. Climate. The equator crosses the mouth of the Amazon, and Antofagasta on the Pacific coast and Rio de Janeiro on the Atlantic coast are both almost on the Tropic of Cancer. Most of the continent is within the tropics, and narrows rapidly in temperate latitudes.

1316. Figs. 101, 102 give the winter isotherms (July) and the summer isotherms (January), and show what the climate would be if the whole continent were at sea-level. Most of South America has hot winters as well as hot summers, and no part has long frosts. In the lowlands the greatest range of temperature is found in the upper Paraguay basin.

1317. Figs. 103, 104 give the mean annual rainfall and its seasonal distribution. They show that South America has very heavy equatorial rains, and that this belt of heavy rains is more symmetrical north and south of the equator than in Africa. The trade winds blow across the continent and are deflected upwards by the high eastern slopes of the Andes, which have a very heavy rainfall. They pass on as dry winds, and much of the lee Pacific coast is dry. Similarly the Guiana and Brazilian Highlands receive heavy rains, and there is a well-marked dry area in the lee of the latter. In the latitudes of the prevailing westerlies the Pacific becomes the wet windward and the Atlantic the dry lee coast. Fig. 104 shows that the drier regions, as we should expect, have their rain when the sun is highest.

1318. The following figures give the actual observations, and height must be taken into account:—

Place.	Latitude.	Longitude.	Height in feet.	Coldest Month.	Hottest Month.	Mean Annual Rainfall.
Caracas . .	10° 30′ N.	66° 55′ W.	3,018	68·5° F.	71·0° F. (May) 70·7° F. (Sep.)	31·9 in.
Georgetown.	6° 50′ N.	58° 8′ W.	10	78·4° F.	79·5° F. (Apr.) 81·1° F. (Oct.)	86·7 ,,
Para . . .	1° 27′ S.	48° 29′ W.	33	77·0° F.	75·4° F. (May) 79·7° F. (Nov.)	86·9 ,,
Pernambuco	8° 4′ S.	34° 51′ W.	98	75·2° F.	81·5° F. (Feb.)	92·8 ,,
Rio . . .	22° 54′ S.	43° 20′ W.	197	67·5° F.	77·9° F. (Feb.)	43·7 in.
Monte Video	34° 34′ S.	56° 13′ W.	26	50·7° F.	71·8° F. (Jan.)	38·6 ,,
Buenos Aires	34° 37′ S.	58° 22′ W.	72	50·0° F.	73·6° F. (Jan.)	36·6 ,,
Bahia Blanca	38° 4′ S.	62° 11′ W.	49	45·5° F.	72·5° F.	20·9 ,,

These figures give the temperature and rainfall of the east coast, and both diminish markedly in higher latitudes. Notice the double hot season at or near the equinoxes in equatorial latitudes. Bahia Blanca on the lee coast is markedly dry, while Valdivia, in Chile (§ 1317), in the same latitude, has a heavy rainfall.

Place.	Latitude.	Longitude.	Height in feet.	Coldest Month.	Hottest Month.	Mean Annual Rainfall.
Para . . .	1° 27′ S.	48° 29′ W.	33	77·0° F.	78·4° F.	86·9 in.
Manaos . .	3° 85′ S.	60° 0′ W.	131	77·9° F.	80·6° F.	83·7 ,,

More numerous figures would bring out still more clearly the hot, moist, wet climate of the densely forested Amazon basin.

1319. The Andean climate is very different. The summer heat decreases and the winter cold increases rapidly with height, and many intermont plateaus and valleys are dry. The eastern ranges of the Andes keep out the trade winds, and between lat. 6° S. and lat. 30° S. the lee Pacific coast is almost a desert.

Place.	Latitude.	Longitude.	Height in feet.	Coldest Month.	Hottest Month.	Mean Annual Rainfall.
Bogota .	4° 35′ N.	74° 14′ W.	8,727	57·0° F. (Aug.)	58·6° F. (Apr.) 58·3° F. (Nov.)	63·5 in.
Quito . .	0° 14′ S.	78° 32′ W.	9,335	54·3° F. (Nov.)	55·8° F. (Feb.)	44 ,,
La Paz .	16° 30′ S.	68° 9′ W.	12,106	44·1° F.	52·7° F. (Sept.)	21·2 ,,
Uspallata	32° 29′ S.	69° 0′ W.	9,335	34·3° F.	53·4° F.	6·9 ,,

These figures require no comment.

Place.	Latitude.	Longitude.	Height in feet.	Coldest Month.	Hottest Month.	Mean Annual Rainfall.
Lima . .	12° 4′ S.	77° 1′ W.	518	60·6° F.	73·4° F.	16·0 in.
Iquique .	20° 12′ S.	70° 11′ W.	30	60·8° F.	70·3° F.	—
Valparaiso	33° 11′ S.	71° 39′ W.	135	52·7° F.	65·5° F.	23·7 ,,
Santiago .	33° 27′ S.	70° 42′ W.	1,703	43·9° F.	67·5° F.	14·6 ,,
Valdivia .	39° 49′ S.	73° 6′ W.	49	45·0° F.	61·0° F.	105 ,,

This table shows the gradual change from dry to wet along the west. Iquique is practically rainless. Valparaiso has Mediterranean winter rains and is wetter than Lima, but Santiago, which is sheltered by the coastal range, is drier. These figures should be compared with those of California (§ 1262). Valdivia is fully exposed to the westerly storms, which blow more fiercely in the southern hemisphere, where water predominates, than in the northern hemisphere, where land and water are more equally distributed.

1320. The following figures show that outside the tropics the climate becomes more extreme and the rainfall smaller as the distance from the sea increases:—

Place.	Latitude.	Longitude.	Height in feet.	Coldest Month.	Hottest Month.	Mean Annual Rainfall.
Asuncion .	24° 27′ S.	57° 2′ W.	345	61·0° F.	79·7° F.	55·7 in.
Tucuman .	26° 51′ S.	65° 12′ W.	1,526	50·9° F.	75·2° F.	38 ,,
Cordova .	31° 25′ S.	60° 38′ W.	1,434	49·3° F	73·2° F.	27·7 ,,
Mendoza .	32° 53′ S.	68° 49′ W.	2,625	46·0° F.	74·1° F.	7·2 ,,

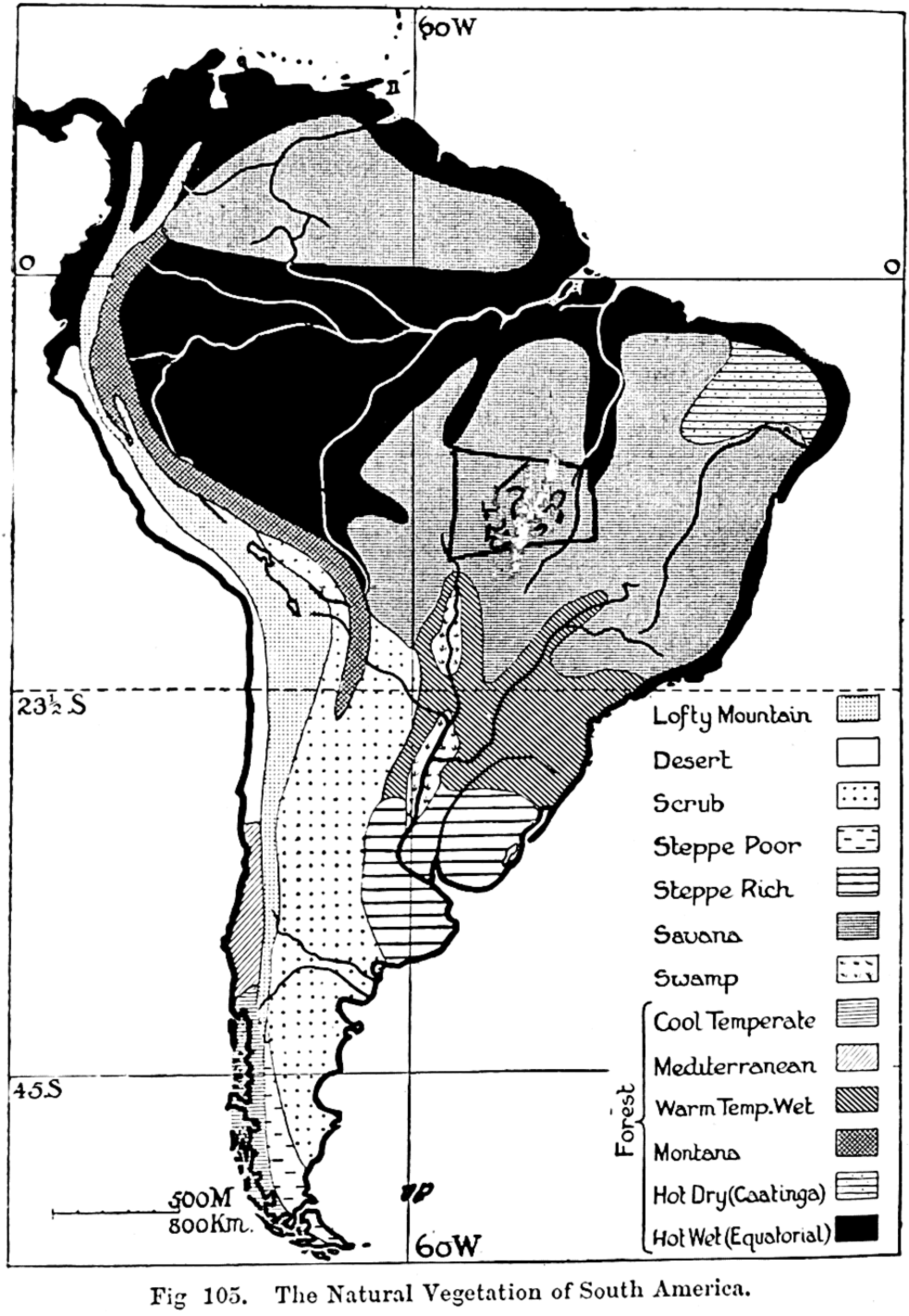


Fig 105. The Natural Vegetation of South America.

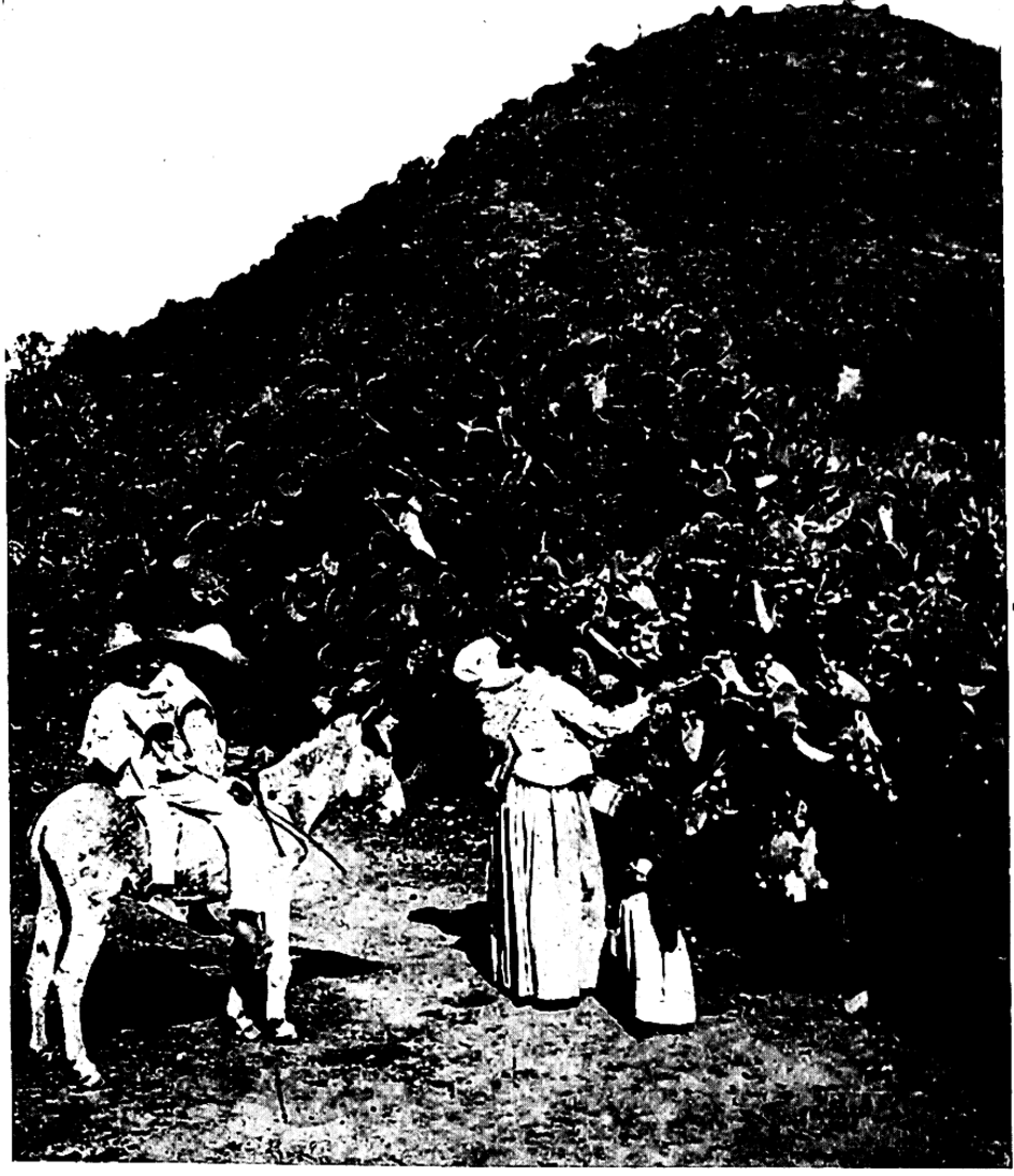
1321. Ocean Currents. A current of heated equatorial water flows south along the east coast of South America, forming the Brazil Current. In the latitudes of the prevailing westerlies the warmer water is driven east across the Atlantic and gradually chilled. The west coast of South America is washed by the cold Humbold Current of water from the Antarctic, driven north-west by the south-east trade winds.

1322. Climate and Vegetation Zones. In the lowlands within 5° of the equator the air is intensely heated by the hot land, and is rising into cooler layers of the atmosphere, where it parts with its moisture as rains. These are heaviest at the equinoxes, when the Sun is overhead at the equator, and the rivers then flood the low-lying country, which is covered with dense forests (selvas). North and south of this belt are the savanas (llaños, campos, pampas), with hot wet summers and dry winters. The north-east trade winds bring heavy summer rains to the Guiana Highlands and the coast of the Caribbean Sea, where the forests are very dense, but the drier interior is a savana land. The east coast of Brazil, which receives rain from the south-east trade winds, especially between October and April, is forested, but the interior is savana. The south-east trade winds reach the eastern slopes of the Andes, which have a very heavy rainfall and are densely forested, forming the montaña belt. The western slopes have a scanty rainfall and are much barer. South of about 35° S. lat. the prevailing winds blow from the west and strike the western slopes of the Andes first. These are densely forested, but the lee eastern slopes are much barer. Patagonia, which lies east of the Andes, in the belt of prevailing westerlies, is a dry steppe region. The *tierra caliente*, up to about 3,000 feet, or the hot belt, where only tropical plants can be grown, e.g. the coco-nut palm, banana, rubber, cacao, sugar, and rice; the *tierra templada*, or temperate belt, between 3,000 feet and 6,000 or 7,000 feet, producing all the plants of warm temperate lands; and the *tierra fria*, or cool belt, producing those of cool temperate lands, are well marked in the Andean belt. Above about 8,500 feet are the cold bleak *paramos*, where vegetation disappears.

1323. South America is thus marked by (i) the vast extent of the equatorial forest, (ii) the variety of climates and products in the Andes, and (iii) the great area of the savanas in the lands which receive summer rains only.

1324. The Selvas of South America. The forests of the Amazon and its tributaries are even more dense than those of the Congo (§ 1022a). The whole Amazon lowland is cut up by great rivers, which in the wettest months are swollen into vast lakes. Only along the banks of the rivers, which make a break in the solid mass of trees, can the beauty of the forest be seen. On the rivers themselves are the splendid blooms of the *Victoria regia* lily, and of other richly coloured water-lilies. Away from the rivers the forest depths are dark and gloomy, and flowers are seldom seen, for these grow high above. The forest is so difficult to penetrate that its great wealth is hardly used. Rubber is only one of a thousand valuable plants. There are magnificent timber trees, beautiful in colour and strong in grain, but they cannot be cut down and sent to market because of the cost of labour. There are clearings round a few river ports, but elsewhere this vast region is a land of plants and not of men. The forests of the montaña of Colombia, Ecuador, Peru, and Bolivia are also selvas.

1324a. A traveller writes of the montaña of the Eastern Andes: 'It is here that the majestic beauty of the Andes is fully realized.



Photograph by Underwood & Underwood.

Fig. 106. Cactus on the dry slopes of the Andes.

Notice the thick fleshy stems of the cactus, which look like large leaves. These store up water in their tissues. The leaves are represented by thorns and spikes attached to the leaf-like stems.

Dark mountains rise for thousands of feet, their bases washed by foaming torrents, and their summits terminating in sharp peaks or ridges. The lower slopes are covered with dense vegetation, and the green tints are often varied by masses of gorgeous flowers. Above the forest the grassy slopes are brightened by the yellow of calceolarias, and the rich purple of other flowers. As the ravines are descended the delicate pink and white of the chinchona blossoms begin to dot the hill-sides. White sheets of foam rush down the polished sides of the precipice and seem to plunge into a bed of flowers and ferns. Everywhere the roar of falling water is heard. As the ravines open out wider views come into sight, and the illimitable plain stretches away in one unbroken forest, its green tints changing to faint blue on the horizon.'

1325. The Savanas. The savanas of the Orinoco are tropical grasslands (llaños, campos), with belts of forest along the rivers. Palms are abundant in the moister parts. The pampas of Argentina are plains of grass, mingled with huge thistles and feathery pampas grass.

1326. Cultivated Plants. Only a few of the more important plants can be named. Rubber is gathered all through the forest region of the Eastern Andes. The chinchona tree, from which quinine is made, is invaluable as a remedy against fever, and has been introduced from South America into other tropical lands. Coca, like the African kola (§1014a), enables fatigue to be borne on a scanty diet. The potato, now grown all over the world, was not known till the Spaniards discovered South America, nor was maize or tobacco. Maté, which grows wild in Paraguay, takes the place of tea. Many plants have been introduced from other lands. Coffee does as well in Brazil as in the best parts of Africa, and cacao is also grown. Cacao is a tender plant, which must be shielded from a strong sun, and the seedlings are planted under the shade of forest trees on the lower slopes of the Andes. Sugar is an important crop round the Caribbean Sea and in Eastern Brazil. Rice and cotton are also grown, and the vine does well where there is a Mediterranean climate with winter rains, as in Chile.

1327. The rolling pampas, like the prairies of North America, can easily be ploughed and reaped by machinery, and the wetter parts are being turned into great wheat lands. These are golden with the harvest when the North American prairies are held in the grip of frost.

1328. South American Animals. Hot wet forests are characteristic of South America, and tree-dwelling animals are very numerous. There are no large apes, like those of the Old World, but monkeys are common. Many animals are fitted only for tree life, and cannot move over the ground; e.g. the sloth, whose fingers and toes have been modified into hooks which allow it to hang from the branches of trees. Tree snakes, or boas, which crush their prey to death, reach an enormous size. The hippopotamus and elephant are not found, but the elephant is represented by the tapir. The iguana is the commonest of many insect-eating animals, and there is an immense variety of beautiful birds, including many parrots and the exquisitely coloured hummingbird and bird of paradise. The alligator takes the place of the crocodile in the rivers, and there are innumerable insects.

1329. Outside the forest belt are (i) the high Andes, and (ii) the great grasslands. The llama, a kind of woolly ox, corresponds to the yak of Tibet, and supplies transport, milk, wool, and fuel. Both the vicuña and the guañaco are South American varieties of the camel, and are half wild and half domesticated. The high Andes of Chile and Ecuador are the home of tiny deer, hardly larger than hares, and among thick-furred animals which live at great heights is the chinchilla.

1330. The grasslands of South America produced neither horse, cattle, sheep, antelopes, nor any of the innumerable steppe or savana animals of Asia and Africa, and the bison of North America was also absent. Horses, camels, and sheep were introduced by the Spanish conquerors, and multiplied enormously. Beasts of prey are few, but the puma, also found in North America, corresponds to the lion of the Old World, and the jaguar to the tiger. The turkey, common in every farmyard of Europe, is a native of South America. The condor sails high above the highest peaks of the Andes. The mosquito in swampy regions, and the locust in dry regions, are as harmful as in the Old World.

1331. Man. The majority of the people outside the temperate belt are of Indian descent, but are reckoned as whites if they have any white blood. The most backward tribes are found in the equatorial forests, where many wandering Indians are ignorant of agriculture, and live by collecting forest produce and by fishing in the innumerable rivers. Their boats are dug-out canoes, made of trees hollowed out by fire. Such canoes are far inferior to the Indian birch-bark canoes of the Canadian forests, or to the Eskimo kayak.

1332. In the grasslands stock-breeding is the chief occupation. The meat industry is as important as in North America, and many other industries grow out of it ; e.g. the making of meat extracts, which concentrates an enormous amount of meat into a very small bulk, thus reducing the cost of transport. Meat is also cured by drying in the hot sun, and is canned and chilled or frozen for export. The hides, hoofs, bones, blood, &c., are used in the same way as in North America.

1333. Agriculture is carried on all round the margins of the continent, and tropical crops are grown at varying heights. Wheat-growing is very important in the grasslands of Argentina and Uruguay, and Argentina ranks third among wheat-exporting countries.

1334. Mining is important in the mountains, and silver is specially abundant. The nitrate deserts of the dry Pacific coast yield fertilizers, and are worked under conditions which recall Coolgardie. Not a blade of grass will grow, and all water has to be brought in aqueducts from the Andean streams.

1335. Peasant industries are numerous outside the tropical forest belt, but manufactures in factories are little developed. The great cities of South America ship the raw materials (rubber, meat and meat products, wheat, minerals, &c.) of the forests and grasslands.

1336. Races, and Political Divisions. Most of the whites are Spaniards, except in Brazil which was formerly Portuguese, and there are many Italians, Germans, and English in the temperate lands. All the States except the Guianas in the north are republics. They are Colombia, Ecuador, Peru, Bolivia, and Chile in the Andes; Venezuela, on the Caribbean Sea; and Brazil, Argentina, Uruguay, and Paraguay east of the Andes.

Exercises

1. Describe fully the seasonal distribution of rain in South America. How far can you account for it?

2. Construct tables to show the chief resemblances and differences between the climate of North and South America, adding any explanation which seems necessary.

3. Describe (*a*) the selvas, and (*b*) the savanas, mentioning the animals and occupations of each. Which is the more thickly settled region? Why?

4. Name the most important wild and cultivated plants of South America, stating where each is found. If possible, compare their distribution with that of the same or related plants in other continents.

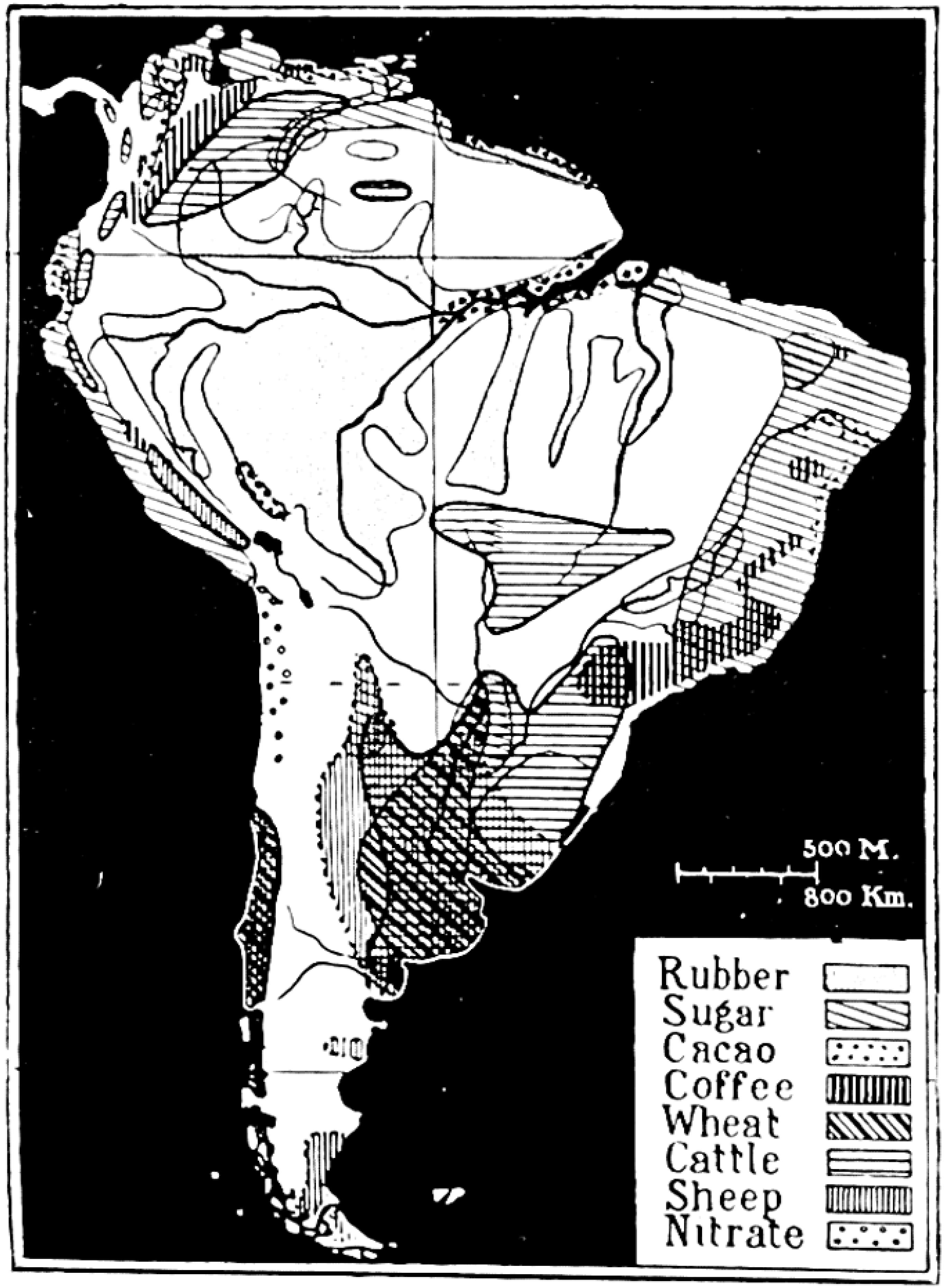


Fig. 107. Economic Products of South America.

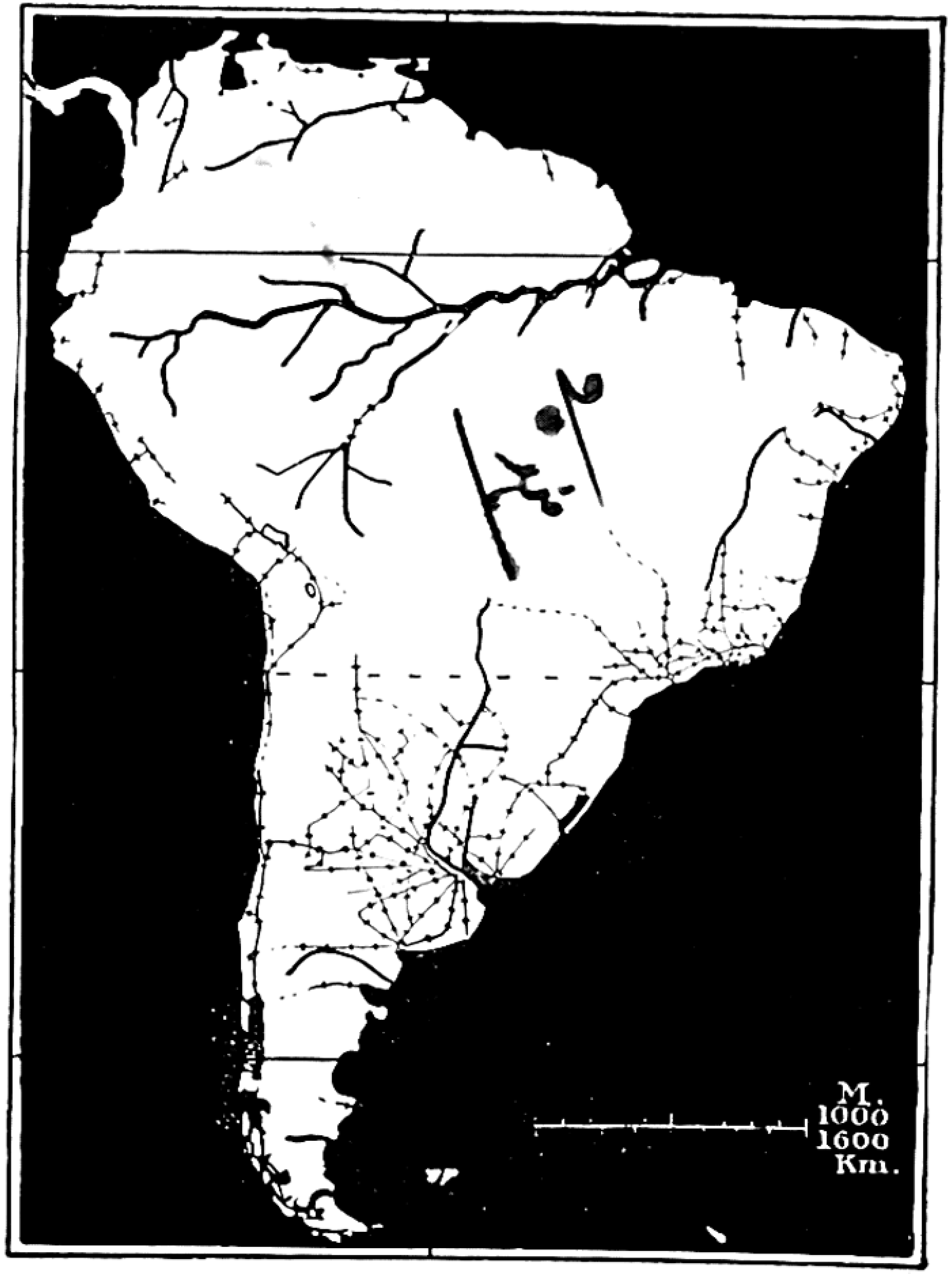


Fig. 108. Railways of South America.

CHAPTER XI

STATES OF SOUTH AMERICA

1337. Venezuela (400,000 square miles, population 2,700,000). Venezuela consists of (i) the Andean region, in the west; (ii) the llaños or savanas of the Orinoco; and (iii) the Guiana Highlands. The Andean region has dense forests up to a height of about 6,000 feet. The valleys are slowly being cleared, and coffee, sugar, cacao, maize and other tropical plants are grown in the *tierra caliente* up to a height of about 5,000 feet. Beans, potatoes, and barley can be grown to 8,000 feet in the *tierra templada* and *tierra fria.* The llaños of Venezuela stretch away as level plains dotted with belts of forest, and rise gradually to the highlands and mountains which shut them in. There is little agriculture, but stock-keeping is important. The rivers have built up lowlands along parts of the coast, and the lake or lagoon of Maracaibo is being filled up by river sediment. East of this the Caribbean coast is mountainous, with fair harbours. Caracas and Valencia are the ports of a coffee and cacao region. The capital, Caracas, is about 6 miles inland, but the railway which connects it with La Guayra, its port, is over 20 miles long, and climbs a pass 5,000 to 6,000 feet high.

1338. The Guianas. British, Dutch, and French Guiana are the only European possessions in South America, with the exception of the Falkland Islands. British Guiana (90,000 square miles, population 300,000), lies east of the delta of the Orinoco. The coast is fringed with mangrove swamps. British Guiana consists of (i) the low alluvial plain, about 20 miles broad, built up by the Essequibo and other rivers; (ii) the llaños; and (iii) the forested south. Most of the people live in the low coastal belt. The Dutch, who first colonized it, reclaimed this low-lying river-built land, as they reclaimed Holland, by building dykes, cutting canals, and pumping out the water. British Guiana is a tropical Holland, where sugar is grown and made into rum and molasses. The capital is Georgetown, set among palms and sugar plantations, on the right bank of the Demerara River. Dutch Guiana (capital Paramaribo), and French Guiana (capital Cayenne), are very similar.

1339. The Orinoco. The Orinoco (1,550 miles) rises in the Guiana Highlands, and after falling rapidly, divides, at a height of about 1,000 feet above the sea, into two branches. One branch, the Cassiquiare, flows south into the Rio Negro, a tributary of the Amazon. The other forms the main stream of the Orinoco, and flows in the opposite direction round the western and northern base of the Guiana Highlands to the sea. The Orinoco flows through (i) the hot wet forests of its upper course; (ii) the grassy llaños of its middle and lower course; and (iii) the mangrove swamps of the coast. In its descent to the sea it forms two series of step-like rapids, which are about 35 miles apart. It is navigable for about 500 miles above the first set of falls, and for nearly 900 miles below the second. It carries most water between April and October, and is highest in July and August, when it floods the low-lying lands. It receives short swift tributaries from the Guiana Highlands, and long slow navigable tributaries (Meta, Guaviare) from the Andes. The port is Ciudad Bolivar, over 200 miles from the sea, at the head of tidal water.

1340. Colombia (500,000 square miles, population 4,500,000). Colombia is an Andean country, with a coast-line both on the Caribbean Sea and on the Pacific Ocean. This and its position near the Panama Canal are advantages which should lead to its rapid growth, but its relief makes both settlement and communication difficult. The Colombian Andes fall steeply on the west to the Pacific Ocean, where Buenaventura, a small place, is the port of a thinly peopled region, and on the east to the lowlands of the Orinoco and the Amazon. The climate is tropical, and much of the country is densely forested, especially in the *tierra caliente.* The longest river is the Magdalena (1,060 miles), which rises 13,000 feet above the sea, and falls over 6,000 feet in the first 40 miles of its course. It forms other falls in its descent to the coastal plain, but is navigable between them, and for the last 200 miles is a broad river, and an important route to the interior. Its tributaries, the Cauca and the Atrato, have similar courses. The forests produce rubber, chinchona, mahogany, and other tropical plants ; and coffee, cacao, sugar, tobacco, and maize are grown in clearings. Wheat and potatoes can be cultivated to the height of 8,000 feet. The mineral wealth includes gold, silver, copper, coal, asphalt, and fine emeralds. The drier regions east of the Andes are savanas, or llaños, on which cattle are kept. The capital is Bogota (150,000), which is built 8,500 feet above the sea in a fertile plateau drained to the Magdalena. The city is built up the slopes of two high peaks, crowned by cathedrals, and from the summits there are fine views over Central Colombia. The chief ports are Cartagena, Barranquilla, and Sabanilla, all on the Caribbean coast.

1340a. The frontier with Brazil, Ecuador, and Peru, in little-known country, is not yet delimitated.

1341. Ecuador (120,000 square miles, population 1,500,000), like Colombia, consists of (i) a hot moist coastal plain; (ii) the Andean region, with its successive zones; and (iii) the forested montaña of the Upper Amazon basin. Ecuador, as the name shows, is crossed by the equator, but the high plateaus have a temperate climate and contain most of the population. The highest peaks of the Andes exceed 20,000 feet, and many are volcanic. Heavy rains fall on the eastern slopes, but the western slopes are dry, and south of Guayaquil, the chief port, the coastal desert begins. Guayaquil, on the gulf of the same name, is the centre of the cacao plantations of Ecuador, which yield the bulk of the world's supply of cocoa and chocolate. The forest produce includes mangrove bark for tanning, from the coastal swamps, and rubber from the eastern montaña. Minerals, including petroleum, are abundant, but little worked. The capital is Quito, finely placed on a high plateau, at the base of Cotopaxi.

1342. Peru (700,000 square miles, population about 4,000,000) consists of (i) the coastal desert, from 20 to 80 miles broad, crossed by short rivers from the Andes; (ii) the sierra or Andean region, with ranges reaching 20,000 feet and enclosing high valleys and plateaus; and (iii) the wet densely forested montaña region, drained to the Amazon. The cold Humbold current chills the coastal waters, and the land, which is bare of vegetation and exposed to a vertical sun, is warmer than the sea. Mists are therefore common along the coast, though rain seldom falls.

1343. Much of the coastal desert is covered with sand dunes, like those of Western Morocco, and is broken only by strips of irrigated land along the small rivers which cross it. Sugar and cotton are the chief crops in these oases, but the blue-green alfalfa (§ 1198), ramie, a dry fibrous plant, maize, vines, and olives are also grown. Callao is the port of Lima, the capital, which is irrigated by the waters of the Rimac. Paita, a small place on a sheltered bay, will become the port of Northern Peru and forward the produce of the Amazon basin by the Panama Canal. The southern port, Mollendo, with a poor harbour, is important as the terminus of railways to the Bolivian plateau.

1343a. The route across the Andes to the Upper Amazon is so difficult that the journey is generally made from Callao to Panama (1,570 miles), thence to New York (2,030 miles), by sea to Para (3,000 miles), and up the Amazon to Iquitos (2,300 miles), a détour of over 7,000 miles.

1344. The sierra region has fertile irrigated valleys, where alfalfa is grown for fodder and llamas and vicuñas are grazed. The Indian shepherds, dressed in gay-coloured blankets or ponchos, made of wool from their flocks, with a hole in the centre through which the head is put, are picturesque figures. This warm light covering, which protects the wearer against the cold after sunset, is worn in all Andean lands. Mining is important, and many silver mines are worked at a great height. The famous silver and copper mines of Pasco (near the source of the Huallaga and Marañon) is connected with Callao by a line through Lima and Oroya. Branch lines are being built to Cuzco (11,400 feet), the old capital of the Incas, and to valleys suited for mining or agriculture. The largest town in Southern Peru is Arequipa (7,500 feet), at the foot of the volcano of El Misti (20,000 feet). It is reached by a line from Mollendo, which is continued to Puña, on Lake Titicaca, the starting-point for steamers which run in connexion with the Bolivian lines.

1345. The montaña of Peru is deeply cut by the gorges in which rivers flow to the Amazon, and inhabited by uncivilized Indian tribes. Rubber is the chief product, and is sent east by the Marañon, the Huallaga, and the Ucayali, all of which are navigable below the gorges by which they break across the eastern ranges of the Andes.

1346. Bolivia (700,000 square miles, population 2,000,000) consists of (i) the high dry puña (12,000 feet, 500 miles long, 100 miles broad), enclosed between the eastern and western chains of the Bolivian Andes; (ii) of the hot wet montaña of the north-east, drained to the Amazon; and (iii) of the dry south-western plateaus, which sink to the savanas of the Plate basin.

1347. The high bleak puña is the most settled part of Bolivia, but the towns are small, and far apart, and roads are bad. Peaks in the ranges which shut it in reach 22,000 feet (Illimani, Sorata), but the snow-line is very high owing to the dry climate. The puña is the bed of an old lake, now represented by Titicaca and Poopo or Aullagas, to which it is drained. The latter is very shallow and is drying up into a vast salt plain. The life is not unlike that of Tibet, which lies at about the same height but farther from the equator. Very little of either country is fit for agriculture, and the population is necessarily small. The potato forms almost the only food of the Indians living round Lake Titicaca. Llamas, like the yaks of Tibet, graze on poor pastures, and are used as beasts of burden. Wood is so scarce that their droppings are used as fuel, and the native boats on Lake Titicaca are made out of bundles of the rushes which grow by the lake shore, with plaited grass sails. The chief wealth is copper and silver in the Western Cordillera, and tin in the Eastern. Bolivia produces about one-third of the world's supply of tin. The silver mines of Potosi (13,300 feet) have been worked for centuries, and gold is abundant in the eastern spurs of the Bolivian and Peruvian Andes. La Paz, the capital, is over 12,000 feet above the sea, about 500 feet higher than Lhasa. It lies in a deep valley watered by a perennial stream, 1,500 feet below the level of the puña, and is sheltered from the gales which sweep the plateau. It is connected by rail with Mollendo in Peru, and with Arica and Antofagasta in Chile. Branch lines run to the more important mining centres. Other towns are Oruro (12,250 feet), a silver-mining centre, Sucre, also a mining town, and Cochabamba, which trades in chinchona or Peruvian bark.

1348. Chile (300,000 square miles, population 3,500,000) is nearly 3,000 miles long and rarely more than 150 miles broad. It not only has a great range of latitude but also varies in height from sea-level to the summit of Aconcagua. The natural regions are (i) the northern deserts, which extend south to Coquimbo; (ii) the central valley, shut in between the coastal ranges and the Andes, with a Mediterranean climate and products; (iii) the Andes, rich in gold, silver, and copper; and (iv) the wet south where the Andes form a sunken glaciated fiord coast like that of British Columbia. The northern desert of Atacama contains vast deposits of nitrates, a mineral fertilizer, and supplies most of the revenue, but the central valley contains all the large towns and most of the people.

1349. The Atacama Desert. In a dry climate the fertilizing elements are not washed out of the soil as they are in wet countries. In many parts of the Atacama desert there are vast deposits of nitrates, or Chile saltpetre, a valuable artificial manure. The richest nitrate fields are some distance from the sea, beyond the coastal range, and 3,000 feet or more above sea-level. Food has to be carried by rail, and water is brought in pipes from Andean streams. The nitrate ports are Iquique (supplied with water by a canal from the Andes), Antofagasta, and Coquimbo. The latter is the centre of a copper region.

1350. The Central Valley of Chile. The long narrow central valley of Chile is about 650 miles long and 30 miles wide, and resembles the valley of California (§ 1286) in situation, climate, and products. It is crossed by rivers from the Andes, and these have covered it with deep alluvial soil, and supply water for irrigating it. The vine comes to perfection, and wheat and barley are grown for export. Santiago (330,000), the capital, at the foot of spurs of the Andes, a fine city with beautiful suburbs, is the fourth city of South America, ranking after Buenos Aires, Rio de Janeiro, and São Paulo. The port is Valparaiso ('Vale of Paradise'), a name to compare with Cape Verde where the desert coast of Africa ends. It is the terminus of the transcontinental line by the Uspallata Pass from Buenos Aires.

1351. Southern Chile is a land of forests with cattle ranches in the clearings. Concepcion and Valdivia are the chief ports. In the cold, wet, bleak south, sheep-breeding is carried on, and whalers and sealers sail to the southern seas. Punta Arenas, the port of Magellan Strait, exports wool, hides, tallow, ostrich feathers, fox skins, and rugs of guañaco and vicuña wool. It will become a coaling station, obtaining coal from Chile, Britain, and Australia. It is 1,600 miles farther south than Cape Town, and nearer the South Pole than any other town.

1357a. Chiloe is the largest of a line of forested islands which stretch for 700 miles along the deeply indented western coast. The climate is wet and cold, and the scanty population consists of poverty-stricken Indian tribes who depend chiefly on fishing.

pampas are now divided by wire fences into farms, or estancias, where great attention is paid to improving the breeds. The Australian eucalyptus, which suits a dry climate, has been freely planted, and breaks the uniformity of the level plains.

1357. Wheat is in growing demand all over the world, and the pampas or Camp of Argentina (Sp. *campo*, a plain) are being cultivated like the prairies of North America. The Camp is very level, and railways can be cheaply built to new districts, and large farms economically worked by machinery. The summers are hotter than those of the North American wheat lands, and the emigrants who pour into the Plate ports come chiefly from Northern Italy or from Spain. Maize, linseed, and wheat are the staple crops, and alfalfa is grown for stock in the drier parts. Agriculture will remain the leading industry, for Argentina has little coal and the sluggish rivers which cross the level Camp do not supply water-power. The chief drawbacks are drought, which is met by dry farming, as in the dry prairies (§ 1198), and locusts, which destroy the crops every third or fourth year. They breed in the north of Argentina in the Gran Chaco, and may become less common as this is cleared and settled.

1357a. The Camp has a beauty of its own, made up of its changing colours, the yellow corn, the vivid blue flax flower, the green and russet of the maize, and the purple blooms of the alfalfa.

1357b. A flight of locusts is as formidable as an army on the march, and more difficult to stop. Railway engines, carriages, and trucks which have passed through a swarm, are often thickly coated with their dead bodies, but a few millions make no difference to their vast numbers. Locusts commonly appear just before the maize harvest, when the wheat ear is hard and the linseed has been gathered. A swarm of locusts will eat a whole plantation bare in a few hours, leaving only the stalks. They can be destroyed in their wingless stage by digging deep trenches in their path, but after their wings develop the farmer is helpless. Ostriches and poultry eat them greedily, but hens' eggs are unfit for human food for some time afterwards.

1358. All the domesticated animals of Europe do well, and cattle and horses are bred in the wetter pampas between the Uruguay and the Parana. Horses are in demand for the armies of Britain and other European countries, and millions of cattle are slaughtered in the Plate ports. The drier parts of Argentina may be compared with South Africa, Australia, and New Zealand. Sheep-breeding is very important, especially in the dry plains of Patagonia. The South African ostrich has been introduced and ostrich-farming is growing. The pastoral products (meat, live stock, dairy produce, hides, and tallow), are valuable exports.

1359. The forest industries are important only in the little-settled north. The most valuable tree is the quebracho, expressively called the 'break axe tree', an evergreen which grows about 50 feet high. Its hard timber is used for sleepers on the Argentine railways, and it also yields a medicinal extract.

1360. The west of Argentina, in the lee of the Andes, has a scanty rainfall, and an extreme climate. Mendoza, at the base of the Andes, on the transcontinental line, is the centre of an irrigated vine-growing region, in which the vine, peach, and other southern fruits come to perfection in the long dry sunny summer. Much wine is made, for it is the national drink of Latin peoples, who form the bulk of the population of Argentina. During the vintage special grape-trains are run to the larger towns. Millions of acres are planted with poplars, which are in demand as fuel, and as supports for vines.

1361. The chief farming and stock-raising districts are connected with the larger towns by a network of railways. Buenos Aires (1,300,000), the capital and port, is built on flat ground near the estuary, and large sums have been spent in deepening the channel so that vessels can come up to the wharves of the city. It has miles of docks and warehouses, and does an enormous trade in meat, cattle, wheat, and wool. The river port of Rosario (175,000) is the second city and can be reached by large steamers, and La Plata (100,000), a port on the estuary below Buenos Aires, is the third. Cordoba (75,000) is the largest city of Central Argentina; Tucuman (70,000), in the north, is the largest town of a sugar, maize, and tobacco district; and Bahia Blanca (50,000), the naval station and arsenal, is becoming an outlet for the rich lands of Southern Argentina.

1362. Uruguay. Uruguay (72,000 square miles, population 1,000,000), an undulating wooded country, has the best grass in South America, and cattle are larger than those of Argentina, and produce finer meat and hides. The climate is too hot for sheep, which yield less meat and wool than those of Argentina. The industries are the slaughtering of cattle, the 'jerking' or drying of beef, which is exported to Brazil, the canning of tongues and corned beef for the European market, the making of meat extracts, and the working-up of refuse into artificial manures. Fray Bentos is the centre of the meat-extract manufacture; and Paysandu is noted for ox-tongues and corned beef. Montevideo (295,000), on an undulating site on the northern side of the Plate estuary, is the capital and chief port.

1363. Paraguay. Paraguay (172,000 square miles, population 750,000), a forested land crossed by great rivers, produces timber, rubber, dyewoods, drugs, sugar, coffee, maize and other tropical crops. Maté, or Paraguay tea, is used all over South America, and is considered a specific against fatigue. The capital is Asuncion (84,000), on the Paraguay.

1364. Brazil. Brazil (3,300,000 square miles, population 17,300,000) contains about half of South America, is larger than the United States, and almost as large as Europe. About two-thirds consists of the lowlands of the Amazon (2,300,000 square miles), which have a slope of less than an inch to the mile. In the east the Brazilian Highlands (§ 1308) form a plateau from 2,000 to 3,000 feet high, but exceed 10,000 feet near the sea. The longest river is the São Francisco, which flows north and then east, and many rivers flow to the Amazon and the Plate. The coast and the healthier and more fertile parts of this plateau (Goyaz, Minas Geraes) are the most thickly peopled parts.

1365. Brazil is broadest in the equatorial belt, which forms the Amazon basin, a wet hot region like the Congo basin (§§ 1324, 1325). The climate, though everywhere tropical, is coolest in the highlands, where the height reduces the heat. In the trade-wind belt the rainfall depends on the position of the higher ground. The exposed slopes receive heavy rains and are densely forested, but the drier regions (campos) are savanas.

1366. The Amazon. The main stream of the Amazon (3,500 miles) rises in the high Andes of Peru, less than 100 miles from the Pacific, and flows eastwards across the broadest part of the continent. At least thirty of its many affluents would rank as great rivers, and each receives many long tributaries. These are navigable and form the only routes through the forest. For the last 250 miles the Amazon is at least 50 miles across, and its mouth, where the great sandbank or island of Marajo divides it into two channels, measures 250 miles from bank to bank. The Amazon carries down much fresh water and sediment, and can be traced several hundred miles out to sea.

the forest Indians, and forwarded to the river ports, the largest of which is Manaos (50,000) at the confluence of the Rio Negro. Elsewhere the vast forest is little used, and is the home of a few hundred thousand uncivilized Indians, who shoot fish with bows and arrows, gather turtle and turtles' eggs, paddle rude dug-out canoes on the streams, live in bark huts when they halt for any length of time, and are ignorant of all but the simplest agriculture.

1370. Outside the selvas, agriculture in the forested highlands, mining and cattle-keeping in the savanas (campos), are the chief occupations. Brazilian diamonds, though valuable, have not the fine colour of South African diamonds. Coffee, the chief crop of Brazil, grown round São Paulo (400,000), is so important that that city has become the third in South America. The port is Santos (35,000). Coffee requires heat, moisture, good drainage, and careful weeding. It is usually planted on land which has been cleared of forest, for this shows that the rainfall is sufficient. The plants are set in rows, with maize or manioc between. The trees come into bearing after three or four years, and three crops can be gathered yearly. Coffee is a strong-growing plant, and exhausts the rather scanty soil of the hill-sides in about twenty-five years. New land is then cleared, and the old plantations are left to relapse into forest.

1371. Only Eastern Brazil is yet developed, and the population is small for the size of the country. The upper classes are of Portuguese descent, but the lower classes have much Indian and negro blood. Many Italians have settled in the warmer eastern province[illegible] and there are German colonies in Southern Brazil, whe[illegible] the climate is more temperate.

1372. The largest towns are all on the coast except the Amazon river ports and São Paulo. Rio de Janeiro (Rio), the capital and largest port, with 1,000,000 inhabitants, is beautifully situated on a fine bay, framed by the Organ Mountains, which reach 7,000 feet. From almost every street there is a superb view of blue sea or of densely forested mountains. The famous botanic gardens contain almost every South American plant. Rio trades in all South American produce, and imports manufactured goods from the Old and New World. The other ports are Para or Belem (200,000), the rubber and vanilla port of the Amazon; Pernambuco (150,000), exporting sugar and cotton; Bahia (230,000), in a region growing sugar, tobacco, and other tropical crops; and Santos, the coffee port.

Exercises

1. Describe the course of (*a*) the Orinoco, *or* (*b*) the Amazon, *or* (*c*) the Plate. Illustrate by a sketch-map.
2. Describe the natural regions of (*a*) Columbia and (*b*) Peru. Account for any differences.
3. Compare human life in the intermont plateaus of North and South America. Point out and explain the most important resemblances and differences.
4. Describe the chief occupations of South America, and say where each is carried on. Compare the conditions as far as possible with those of North America.
5. Compare the advantages of (*a*) Argentina and (*b*) Brazil for (i) rapid and (ii) dense settlement.
6. Compare (*a*) Bolivia and Tibet, (*b*) Argentina and the Canadian prairies.
7. Account for the position of Buenos Aires, Manaos, Quito, Rio de Janeiro, and Valparaiso, and show how it influences the growth of each city.

INDEX TO PART VI

(The references are to the pages)

Aconcagua Mt., 339.
Adirondack Mts., 242.
Alaska, 307.
Alberta, 298–9.
Alfalfa, 274.
Allegheny Ridges, 248.
Amazon R., 340, 370-2.
America, 233–374.
Anahuac Plateau, 327.
Andean Lands, 359–65.
Andes, 339–40, 341–3.
Annapolis, 289.
Anticosti I., 294.
Appalachian Highlands, 246-9; valley, 248.
Arequipa, 361.
Argentina, 356-9.
Arkansas R., 251.
Asuncion, 369.
Atacama desert, 363–4.
Athabasca R., 250; L., 250
Atrato R., 339, 359.
Aztecs, 280, 342.

Bahama Is., 333–4.
Bahia, 374.
Bahia Blanca, 369.
Baltimore, 317.
Barren Grounds, 271.
Belize, 331.
Bermuda Is., 307.
Bison, 278, 300, 324.
Black Hills (Dakota), 249.
Bogota, 359.
Bolivia, 362–3.
Boston, 314.
Brazil, 370–4.
Brazilian Highlands, 337, 340.
British Columbia, 256, 302–6.
British North America, 283-307.
Buenos Aires, 368.
Buffalo (N.Y.), 320.

C. P. R., 293, 297, 301-2.
Cacao, 352, 357, 860.
Cactus, 274, 328, 351
Calgary, 301, 302.
California, Gulf of, 260; Peninsula of, 260; Valley of, 260, 326.
Callao, 361.
Campos, 341, 349.
Canada, 284-307.
Canadian National Park, 254; Rockies, 254.
Canyon (Colorado), 257; (Snake), 257; (Yellowstone), 255.
Cape Breton Is., 289.
Cape Horn, 234, 235.
Caracas, 357.
Cascade Mts., 258, 259, 325.
Cauca R., 339, 359.
Central America, 330–2.

Champlain L., 247, 293.
Charleston, 319.
Chesapeake Bay, 317.
Chicago, 321-2.
Chile, 363–5.
Chiloe Is., 364.
Chinook winds, 268, 300.
Cincinnati, 323.
Ciudad Bolivar, 357.
Cleveland, 320.
Climate Statistics of North America, 264, 265, 267, 285, 286, 309-10, 328; of Central America, 330; of the West Indies, 333; of South America, 346, 347.
Coffee, 352, 373.
'Cold snaps', 261.
'Cold-wall', 269.
Colombia, 359.
Colorado Plateau, 256, 257; R., 257; Canyon, 257.
Columbia R., 254, 255, 302, 304.
Connecticut, 247, 313.
Continental divide of North America, 253, 254.
Cordilleran Plateaus (N. America), 256–8, 839, 340, 341.
Cordoba, 369.
Cotton, 274, 319, 324, 328.
Cuba, 334.
Currents, 268–9, 349.
Cuzco, 361.

Dawson City, 307.
Delaware R., 248, 317.
Deserts of N. America, 257–8, 266; S. America, 347, 348, 360, 361, 363, 364.
Drowned coasts, 311.
Dry farming, 274.
Duluth, 321, 323.

Ecuador, 359.
Edmonton, 301, 302.
Erie L., 242, 243, 244.
Eskimo, 28.
Esquimalt, 306.
Essequibo R., 340.

Fall City, 313.
'Fall line', 292, 293, 313, 319.
Fibre plants, 274, 328, 329.
Fiord coasts, 246, 247, 283, 304, 306.
Fisheries, 278, 283, 284, 290, 305, 306.
Florida, 319.
Forests, 237, 298, 305, 321, 333, 334, 850, 851, 371–3; of N. America, 271–3.
Fraser R., 254, 255, 302, 304.
Fundy Bay, 289.
Fur trade, 280, 298.

Galveston, 324.
Georgetown, 358.
Glacial lakes, 283, 292, 294, 297–8, 304.
Glaciation in N. America, 242, 250, 283.
Great Basin, 256, 257–8.
Great Bear L., 250.
Great Lakes, 240–6, 319–20.
Great Salt Lake, 250, 258.
Greater Antilles, 332.
Greenland, 242.
Guatemala, 330.
Guayaquil, 360.
Gulf Stream, 268.
Guiana, 357–8; Highlands, 340.

Halifax, 289, 90.
Havana, 334.
Heat waves, 261.
Hispaniola Is., 334.
Honduras, 830; (British), 330, 331.
Huallaga R., 339.
Hudson R., 246, 293, 314–7, 319.
Humbold current, 360.
Huron L., 242, 243.

Ice, harbours closed by, 243, 246, 293, 294, 302, 305.
Icebergs, 264.
Idaho, Lava Plateau of, 256.
Incas, 342.
Indianapolis, 323.
Iquitos, 342.
Irrigation, 305, 308, 325, 326, 341, 361.
Isotherms of N. America, 260-3; S. America, 346.

Jamaica, 333-4.

Kansas City, 323; R., 250.
Kentucky, 321.
Key West, 319, 334.
Kicking-Horse Pass, 254.
Kingston (Ont.), 295; (Jam.), 333, 334.
Klondyke, 256, 307.
Kootenay R., 254, 255, 304; Pass, 254.

La Guayra, 357.
La Paz, 367.
La Plata, 369.
Labrador, 241, 283, 284; current, 264, 269, 283.
Lachine Rapids, 244, 293.
Laurentian Highlands, 241–6,
Lava Plateau of Idaho, 256.
Lesser Antilles, 333.
Lethbridge, 302.
Liard R., 250, 253, 304.
Lima, 361.

7/50 8/10 - X

Llamas, 342, 353, 362.
Llaños, 341, 349, 357.
Los Angeles, 326.
Louisville, 321.
Lumbering, 280, 287, 294, 295.

Mackenzie R., 249-50, 304.
Madeira R., 371.
Magdalena R., 339, 359.
Magellan Strait, 235.
Maize, 274, 292, 323.
Manaos, 373.
Manitoba, 297-8; L., 250.
Marañon R., 339.
Maryland, 317.
Meat-packing, 281, 321-2, 323, 324, 354, 355, 368-9.
Mesa, 257.
Mexico, 327-9; city, 329.
Michigan L., 242.
Milwaukee, 321, 323.
Mineral wealth, 248, 249, 256, 281, 283, 289, 292, 295, 300, 305, 306, 311, 319, 320, 321, 324, 329, 341, 342, 355, 359, 360, 362, 363.
Minneapolis, 322.
Mississippi R., 250-1, 322, 323.
Missouri R., 250-1, 253, 254.
Mobile, 324.
Mohawk R., 247, 317, 319.
Mollendo, 361.
Montaña, 349, 350, 359, 360.
Monte Video, 369.
Montmorenci Falls, 241.
Montreal, 293-4.

Nanaimo, 305, 306.
Natural Regions of N. America, 269-70.
New Brunswick, 290.
New England, 313-4; Highlands, 247.
New York, 314-7.
Newfoundland, 240, 283-4; Banks, 283.
Niagara R., 243, 244; Falls, 243, 244, 245, 295.
Nicaragua, 330.
North America, compared with South America, 235-40; relief of, 241-60; climate of, 261-70; plants and animals, 271-8; occupations, 278-82; regional geography, 283-329.
Nova Scotia, 289-90.

Occupations, 278-82, 284, 287, 289, 290, 292, 293, 294, 295, 297, 298, 299, 300, 301, 305, 306, 307, 310-11, 313, 314, 317, 320, 321, 322, 323, 324, 325, 326, 329, 332, 341.
Ohio R., 251, 320.
Omaha, 323.
Ontario, 294-7; L., 242, 243, 244.
Orinoco R., 340, 358.
Ottawa, 294, 295; R., 244, 293.

Pampas, 341, 349, 365-9.
Panama, 330; Canal, 234, 235, 332.
Para, 371, 374.
Paraguay R., 365, 366.
Paraguay-Parana R., 340.
Paramos, 350.
Parana R., 365, 366.
Paysandu, 369.
Peace R., 250, 253, 304.
Pensacola, 324.
Pernambuco, 374.
Peru, 360-2.
Peruvian bark, 363.
Philadelphia, 317.
Piedmont Belt, 246, 247.
Pilcomayo R., 365.
Pittsburg, 320.
Plate countries, 365-9; rivers, 340, 365-6.
Platte R., 250, 255.
Potomac R., 248.
Popocatapetl Mt., 256, 329.
Portland (Me.), 314; (Or.), 325.
Porto Rico, 334.
Prairies, 249, 273-4, 277-8, 322-4.
Prince Edward I., 287.
Prince Rupert, 302, 306.
Providence (R.I.), 214.
Puget Sound, 258, 304, 326.
Punta Arenas, 364.

Quebec, 291-4.
Queen Charlotte Is., 258, 304.
Quito, 360.

Rainfall of N. America, 265-7.
Red River (of the North), 298, 322; (of the South), 251.
Regina, 301.
Richelieu R., 293.
Rio de Janeiro, 374.
Rio Grande, 253, 327.
Rio Negro, 371.
River floods, 251, 371.
Rivers, constructive work of, 251, 341.
Rocky Mts., 253-5.
Rubber, 350, 352, 359, 360, 361, 362, 369, 371.

S. America, 337-74; relief of, 337-43; climate of, 345-9; plants and animals of, 349-54; occupations of, 354-5; political divisions of, 355; regional geography of, 357-74.
Sacramento R., 260, 326.
Salmon-canning, 306, 325.
Salt Lake City, 325.
Salvador, 330.
San Francisco, 260, 326.
Santiago de Chile, 364.
Santiago de Cuba, 334.
Santos, 373, 374.
São Francisco R., 340, 370.
São Paulo, 373, 374.
Saskatchewan, 298; R., 250, 298.
Savanas, 341, 349, 352.
Selkirk Mts., 254; Ranges, 256, 302, 304.
Selvas, 341, 349, 350.
Sierra Madre, 255, 256, 327.
Sierra Nevada, 260.
Skeena R., 304.
Snake R., 256, 257.
Soo (Sault Ste Marie), 243.
St. Elias Alps, 258, 306.
St. John, 290.
St. John's, 284.
St. Lawrence R., 242-6.
St. Louis, 323, 324.
St. Paul, 323.
Stikeen R., 304.
Superior L., 242, 243.
Sydney, 289.

Tacoma, 326.
Tampico, 329.
Tehuantepec, Isthmus of, 236, 256, 327, 330.
Tennessee R., 248.
Texas, 324-5.
Tierra caliente, 328, 331, 349.
Tierra del Fuego, 364.
Tierra fria, 328, 331, 350.
Tierra templada, 328, 331, 350.
Titicaca L., 340, 342, 361, 362.
Tobacco, 313, 317, 319, 321, 328.
Toronto, 295.
Trinidad I., 334.
Tucuman, 369.
Tundra, 271, 276-7.

Ucayali R., 339.
United States, 308-26.
Uspallata Pass, 339, 341, 342.
Uruguay, 369.

Valparaiso, 364.
Vancouver, 306; I., 258, 304, 306.
Venezuela, 357.
Vera Cruz, 329.
Vermont, 314.
Vicksburg, 324.
Victoria, 306.
Virginia, 317.
Volcanoes, 239, 256, 258, 329, 330, 333, 334.

Wasatch Mts., 256.
Washington (D.C.), 319.
Water-power, importance of, 244, 247, 291, 292, 293, 415.
West Indies, 332-4.
Westerly winds, 234, 265, 266, 268, 347, 391.
Wheat, 273, 274.
Wheat-growing in Canada, 298-300; in S. America, 353, 356-9; in U. S. A., 322-3.
Willamette R., 260, 325.
Winnipeg, 297, 301, 302; Lake, 250, 297.
Winnipegosis L., 250, 297.

Yellowhead Pass, 254.
Yellowstone R., 250, 254, 255; Park, 255.
Yosemite Valley, 260.
Yucatan, 274, 327.
Yukon, 306-7; R., 306, 307; Plateau, 256.

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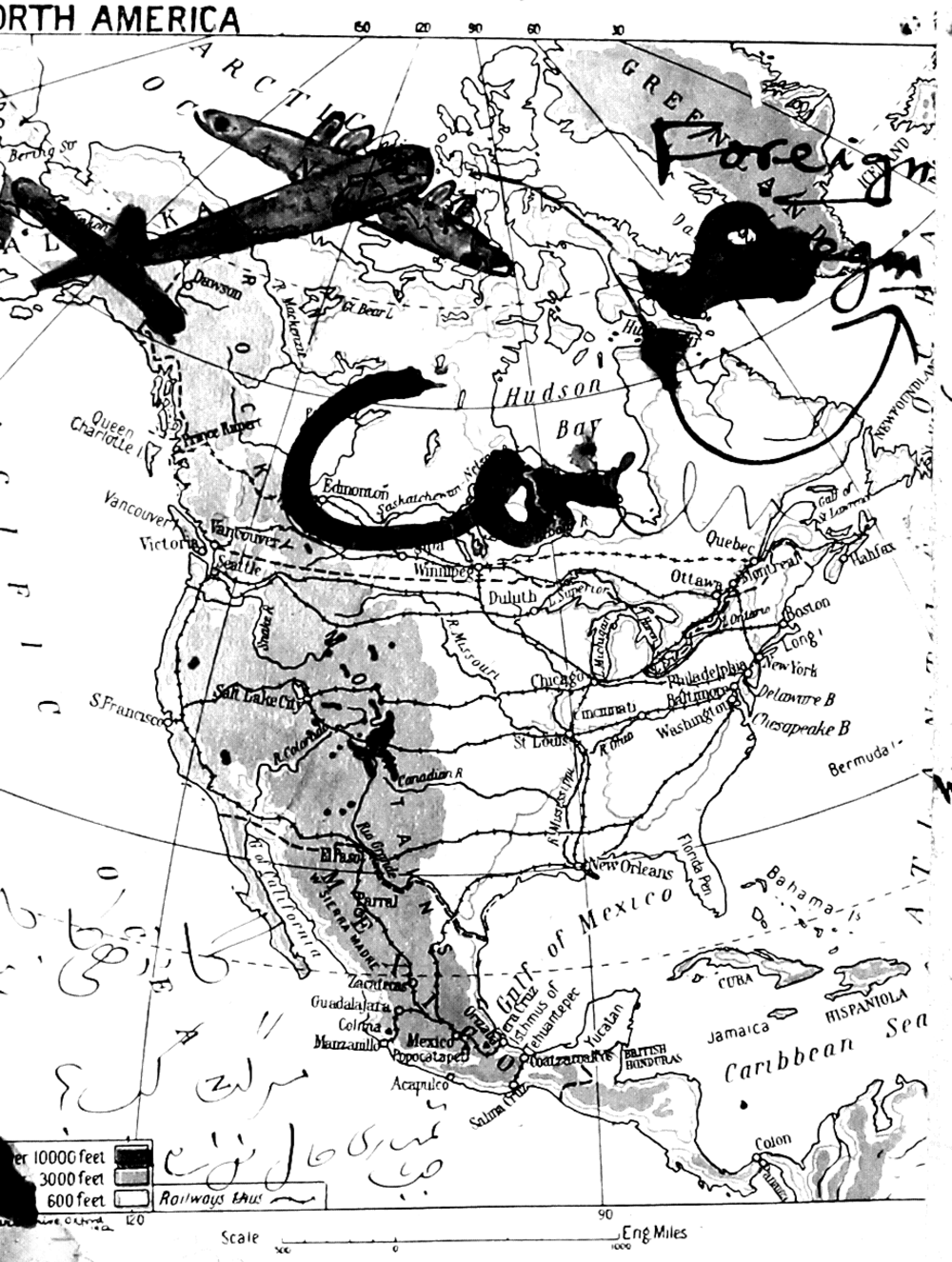

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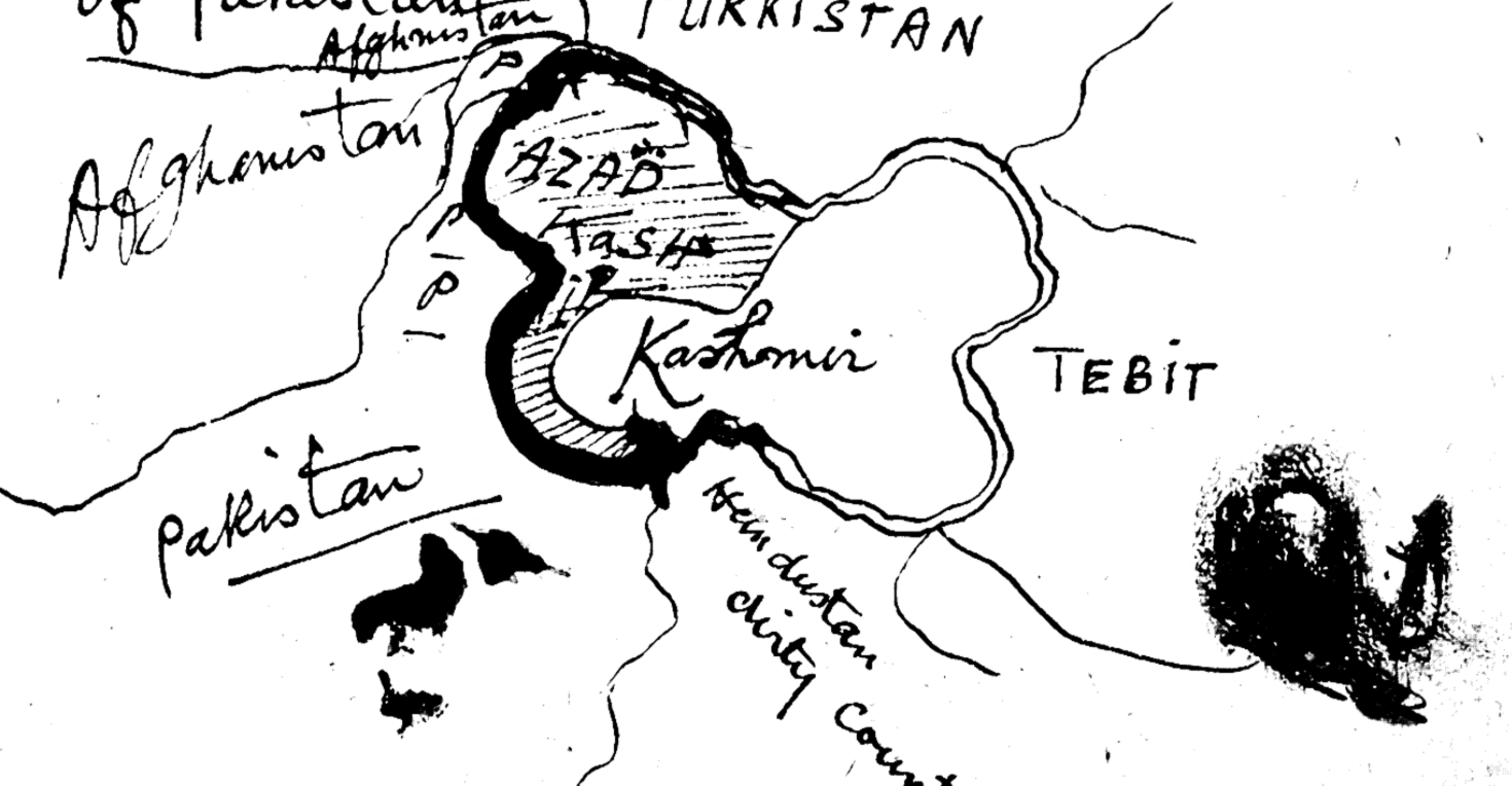

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